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FACTORY

october 1961

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SPECIAL REPORT
ON THE FOREIGN
WORKER
p. 95

EQUIPMENT
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GROWS UP
p. 106

IF WAR COMES...
p. 114

COVER STORY
BRAINSTORMING
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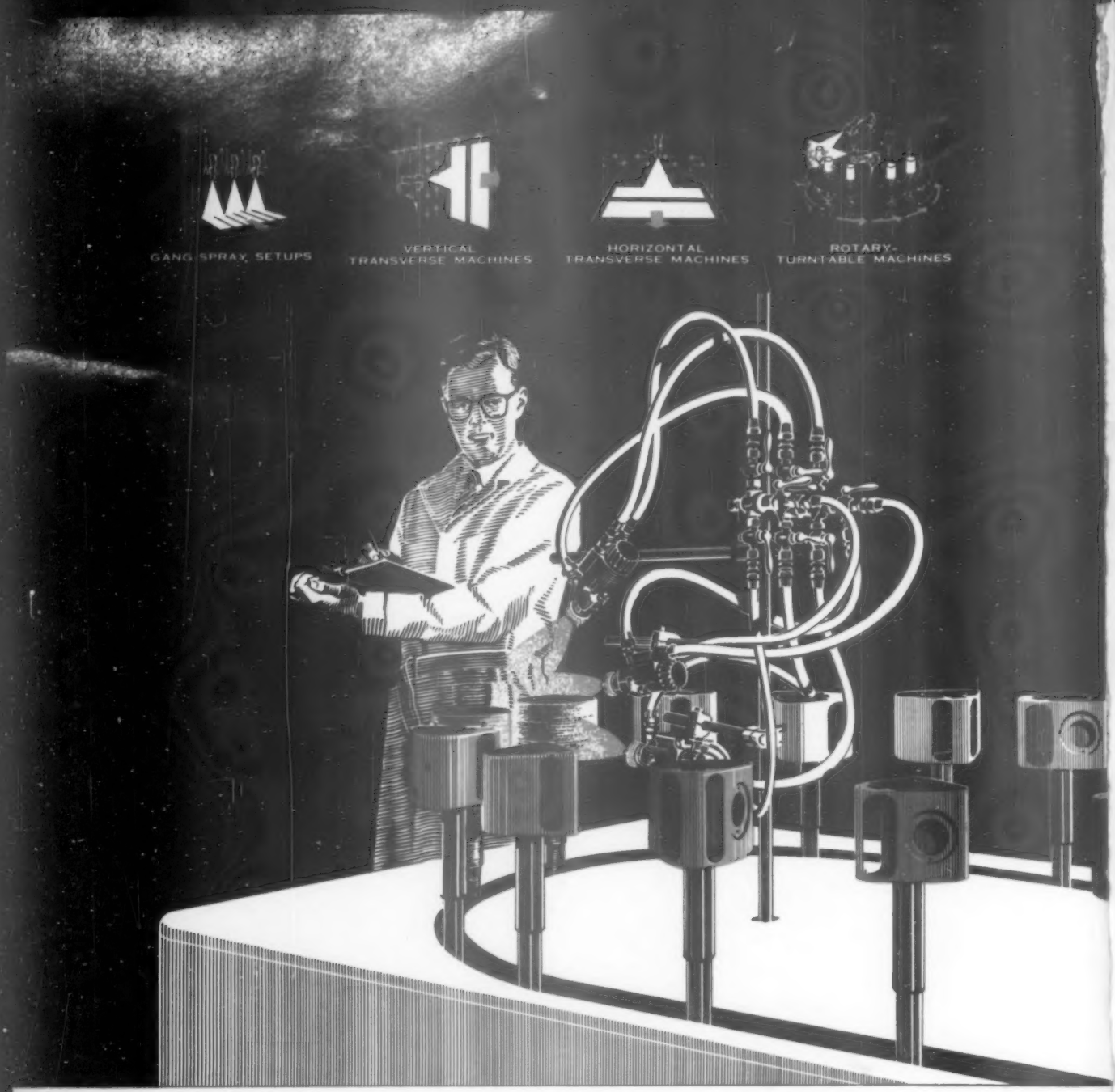

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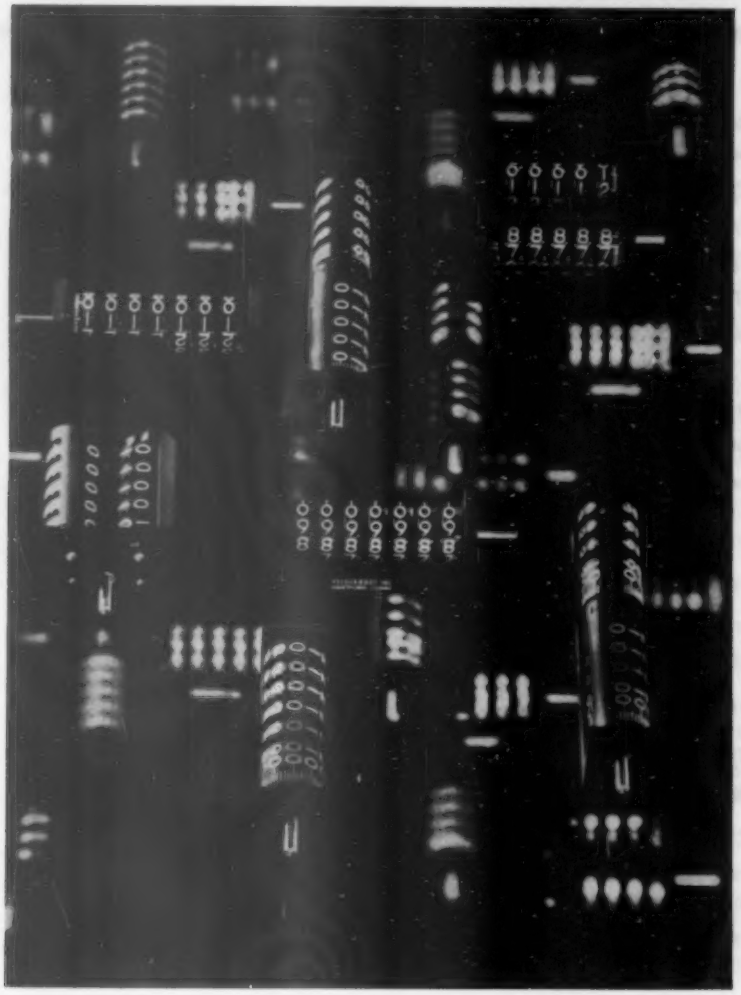

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OCTOBER 1961

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COMING

In November don't miss FACTORY's attack on Indirect Costs. We will tell you what things to check, give you specific suggestions on cutting costs, and show you the ways in which cost cutting ideas are being put to work in plants across the country. At the left, vacuum equipment at Great Lakes Manufacturing Corp., Cleveland, makes savings possible by cleaning sumps in one third the time formerly needed.

COVER

Production Engineer Karl Salanda, Vice-President of Mfg. J. J. Topolinski, and Plant Engineer Frank Jelinck (left to right) examine hand tool part in Skil Corporation's newly conveyorized Chicago plant.

Painting by Frank Lacano

FACTORY 70TH YEAR OF PUBLICATION
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Turn the page for FACTORY'S Problem-Solving Guide

PROBLEM-SOLVING GUIDE

Leads to read and save

1.0–1.4 Plant maintenance and engineering

MANAGEMENT AND PRACTICES (1.1)

1.113 Maps for keys (Oct. '61) p. 181 (1.104)

1.113 Traveling die doctor (Oct. '61) p. 189 (1.401)

1.113 Plastic putty patching pays (Oct. '61) p. 190

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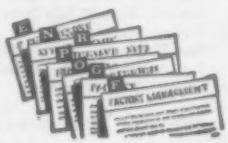

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For ways to use your Guide, write Reader Service, FACTORY, 330 W. 42nd St., New York 36.

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3.403 Indian-giving boss (Oct. '61) p. 194 (3.303)

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LETTERS

President Kennedy responds to FACTORY

Dear Sir:

The President has received your letter following his May 25th Message to the Congress. He was pleased to know of your approval and asked me to express his gratitude.

Your interest in sending the President the page proofs of the FACTORY article "Industrial Civil Defense—Is It Helpful or Hopeless?" (June 1961, page 230) is also appreciated, and he is bringing them to the attention of the appropriate officials.

Ralph A. Dungan
Special Assistant to the President
The White House, Washington, D.C.

► **FACTORY has long been interested in industrial civil defense and hopes this article will help awaken broad interest in the problem. We are naturally pleased by the attention received from the President.—ED.**

Objectivity wins praise from reader

Dear Sir:

We were pleased with your objective handling of the article "Can Fuses Replace Breakers?" (FACTORY, July 1961, page 67). One of our engineers commented that he felt as though he had just listened to a Kennedy-Nixon debate.

Your readers may be interested to know that one limitation of power fuses mentioned in the article—the problem of coordinating fuses in series so that the one nearest the load will open—has been reduced through a recent development. Fuse refills for "incoming" service, which "wait out" the opening of regular feeder fuses, are now being manufactured.

It's commendable that FACTORY put the cards on the table with the certain knowledge that advertisers on both sides of the fence will snipe away at the findings. Keep up the good work.

William E. Dunshee
Sales Production Manager, S&C Electric Co., Chicago

An open letter to Secretary Hodges

Dear Sir:

How can business create, as you suggest in your article "Today's Prophets of Doom Are Wrong" (FACTORY, August 1961, page 62), upwards of five million jobs by applying vigor and imagination? It is trapped and ensnared in unfair taxes, antiquated depreciation regulations, and government competition.

There is nothing wrong with business that fair treatment from the government would not rectify. However, instead of actually doing this, the present administration makes a lot of high-sounding promises for public consumption but then continues to use business and industry as its "whipping boy."

You say "Let labor cooperate in the further modern-

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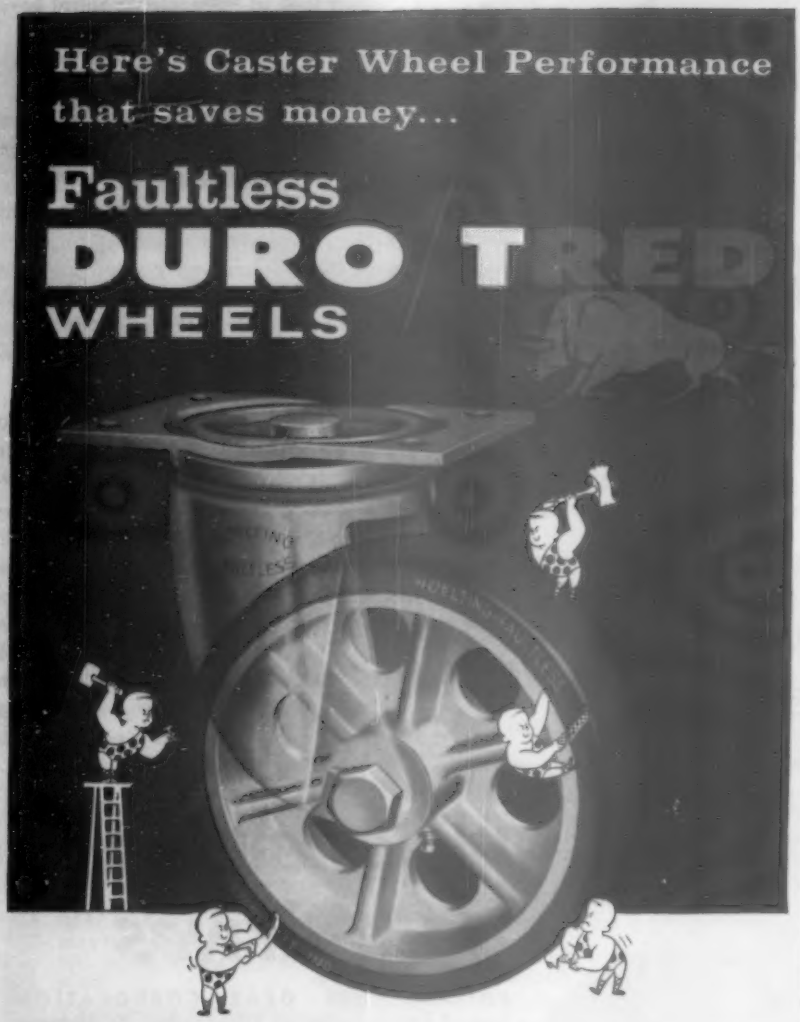

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8 For more facts Circle 411 on Reader Service Card

Begins on page 6

LETTERS

ization of our technology and pursue responsible wage policies." This statement is laughable in view of past and present labor practices. Again, just a lot of wishful talking with no action to back it up. The mass hatred and collectivism with which the labor leaders are indoctrinating our people fosters the viewpoint that what is good for business is bad for unions.

The union's cry always is "Pay us more but don't ask us to produce more; and don't ask us about installing labor-saving practices." Then, if the company resists, all the union has to do is strike, and Uncle Sam will step in to get the cruel and merciless business man to pay more.

No, Mr. Secretary, your words leave me cold!

Floyd B. Gerard
322 N. Pennsylvania Ave.
Greensburg, Pa.

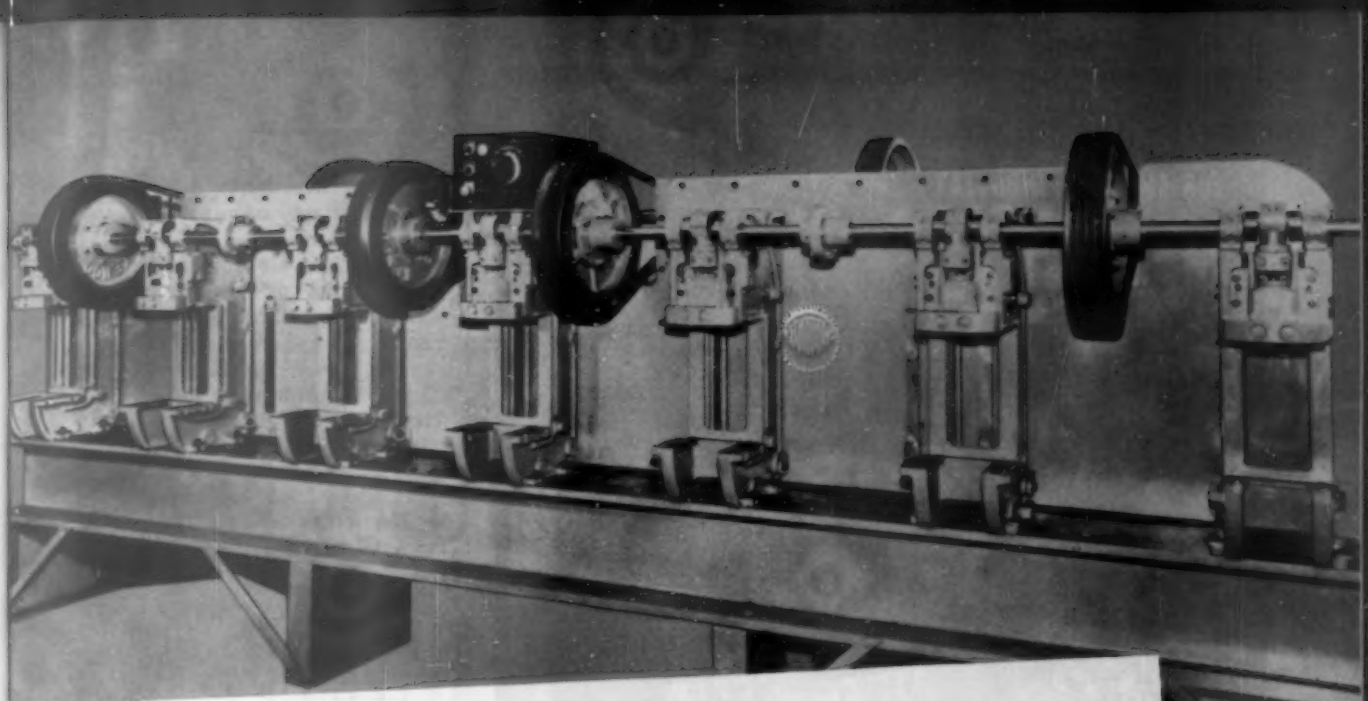
Commentary compliment

Dear Sir:

I've just finished reading your fine commentary on the shortage of plant electrical engineers (FACTORY, July 1961, page 91). I'd like to say that I think everything you've written is certainly true.

With your permission I would like to submit a copy of your editorial to the AIEE national president asking him to direct it to the attention of our student branch groups in universities and colleges. More of these future electrical engineers might thus give

FACTORY welcomes opinions and suggestions from its readers. They help us put management problems in better perspective. Letters should be addressed: The Editor, FACTORY, 330 West 42nd St., New York 36.



Dayco CORPORATION

Dayton Industrial Products Co. Div. Melrose Park, Illinois

"Non-slip Dayton Cog-Belt® saves 25 to 55% of final drive cost" ...president, Kenco Mfg. Co., Los Angeles

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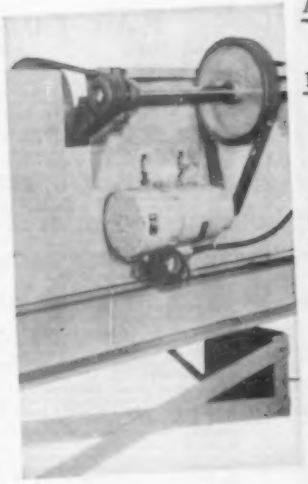

Application: Metal punch presses gang-driven by synchronous motors

Drive Conditions: Seven presses ganged on 16 ft bed operate on 1-1/2 inch stroke, 90 strokes per minute. Impact, 8 tons per press, 56 tons total.

Cog-Belt Results: On previous tests made by Kenco using 18 ton slow-speed press with 19 ton load, Cog-Belts showed 44% less slippage than other V-Belts. On 8 ton press using 1-1/2" P.D. sheave, Cog-Belts had 26% less slippage.

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BOX 501, DEPT. F-1061, DETROIT 32, MICH.

Begins on page 6

LETTERS

serious thought to plant engineering career opportunities.

Again let me congratulate you on one of the frankest editorials that I have ever read.

R. E. Stroppel
Plant Engineer
The Tool Steel Gear and Pinion Co.
Cincinnati

► **The AIEE should be able to do much in solving this problem.—ED.**

Timely article

Dear Sir:

Will you kindly quote on 100 copies of "Public Control of Industry Affairs: The Road Ahead" (FACTORY, July 1961, page 61)? It is a frightening but, nonetheless, pertinent and timely article.

R. Yvonne Park
Wes-Pine Millwork, Inc.
West Hanover, Mass.

► **Reprints are still available.—ED.**

FACTORY

October 1961 Vol. 119, No. 10

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Pioneered by Pratt & Whitney Aircraft and Mobil®...

A REVOLUTIONARY APPROACH TO PLANNED LUBRICATION AND PREVENTIVE MAINTENANCE THROUGH DATA PROCESSING

—achieving tremendous economies.

ON THE FOLLOWING PAGES, Mobil presents an important new technique in plant lubrication and preventive maintenance management developed by Pratt & Whitney Aircraft Division of United Aircraft Corporation, with Mobil help.

It is an impressive example of how Mobil customers can benefit from the skill and scope of the largest lubrication service program in the industrial field. It is worth the careful attention of every executive who seeks maximum efficiency and lowest cost in the operation and maintenance of industrial and fleet equipment.

Mobil

MOBIL Oil Company
150 East 42nd Street, New York 17, N.Y.
Reprints of this advertisement are available

SEE FOLLOWING PAGES FOR DETAILS ——————→

Data Processing Control of Maintenance Costs

RESULTS:

IN 3 SHORT YEARS—1958 TO 1961— PRATT & WHITNEY AIRCRAFT HAS REAPED THESE BENEFITS IN THE MAINTENANCE OF 12,000 PRODUCTION MACHINES

1. Increased efficiency of machine repair department by 40%.
2. Reduced unscheduled or emergency calls by 25%.
3. Increased productivity of lubrication department personnel by 35%.
4. Purified and re-used 150,000 gallons of lubricating oil each year.
5. Reduced loss of lubricant by leakage by 4,200 gallons per month.
6. Reduced maintenance hours per year on a battery of tracer controlled units from 1,879 to 243; reduced number of repair calls by 72%.
7. Reduced number of lubricants in service from 44 to 18.

QUICK ANSWERS TO MAINTENANCE PROBLEMS

The data processing system at Pratt & Whitney Aircraft schedules 90 separate maintenance operations on 12,000 production machines in three plants. It keeps tabs on what was done, how long it took, what it cost. It spotlights lubricant waste, excessive repairs, unscheduled down time, and high maintenance cost units.

Don Nigro (right), Pratt & Whitney Aircraft Master Mechanic, shows Mobil Field Engineer Bill Allman how the computer system automatically schedules most efficient maintenance by printing instruction cards for each machine.

Mobil

How Pratt & Whitney Aircraft Revolutionized Its Lubrication and Preventive Maintenance with Mobil Help.

Mobil Program of Correct Lubrication Protects 12,000 Production Machines Built by 400 Different Equipment Builders.

In 1958, Pratt & Whitney Aircraft, the world's leading designer and manufacturer of jet engines took a bold forward step in reducing and controlling maintenance costs. P&WA decided to program into its data processing control system all information necessary to provide both the scheduling and recording of all maintenance operations: what to do, when, where, and was it done, who did it, time consumed, volume of lubricant used, unscheduled calls, and other deviations from normal.

With a total of 12,000 production machines built by over 400 different equipment manufacturers located in three separate plants, this posed a gigantic problem requiring detailed knowledge of every piece of equipment. Mobil was the logical source of help for specific lubrication application data because of Mobil's established Equipment Builders Service which regularly maintains contact with 5,000 machinery builders the world over.

How It Works

P&WA has computerized the scheduling of all routine machine service functions. Automatically scheduled on a periodic basis are 90 different routine machine service functions totaling over 18,000 operations in three plants. Examples of these service functions are: change coolant, filter coolant, change hydraulic system, periodic machine inspections, etc. Scheduling by computer has released foremen from the requirement of manually scheduling an operation which is too complex to be done in this manner. The results show not only a substantial reduction in labor and material costs, but a better job.

Daily machine maintenance activity is collected in the form of punched paper tape. From the tape is maintained a complete maintenance history record for each machine which includes down time, repair costs (labor and material) and a complete description of work done. The repair history and machine condition reports which are coded and shown on the master record are used for considerations of machine application, overhaul or replacement. Runoffs by machine type and department are used to point up problem areas so that the best thinking of both maintenance supervision and operating supervision can be brought to bear. In addition, reports are compiled on starting and completion dates, work backlogs in hours, employee records and departmental performance.

How Mobil Helped

For many months Mobil's technical staff worked with P&WA production engineers to standardize and simplify machine lubrication and hydraulic system procedures. For each piece of equipment, a master card was prepared listing parts to be lubricated, lubricant used, frequency of re-application, system changes, filter changes and personnel responsibility.

The complexities of analyzing the lubricant recommendations of the 400 manufacturers were simplified by Mobil contacts with these builders. As a result, the number of lubricants was reduced from 44 to 18 with the builders' approval. This was far more complicated than the usual "survey," involving frequency, coding, inspection and preventive maintenance. Concrete recommendations were made by Mobil in these areas. With this specific information on hand, P&WA programmed these factors into the data processing control system. In setting up the system, the goals were:

1 *To establish an accurate control of work arrangements to facilitate scheduling, to establish completion times.*

2 *To reduce unscheduled down time and machine part replacement costs from lack of adequate lubricants.*

3 *To develop accurate follow-up information regarding correct use of predetermined lubricants, proper frequencies maintained, adequacy of filter and lubricant change periods.*

4 *To spotlight chronic leakers or high lubricant make-up units.*

5 *To spotlight high maintenance cost units.*

6 *To identify need for machine design improvements as determined by specific local uses.*

As a result of careful planning and intimate knowledge of all machine requirements, an automatic system of inspection, lubrication and maintenance was set up. Mobil preventive maintenance methods were adopted for all hydraulic and circulating systems. Inspections indicated the need for filtering circulating oils in place every six months. Automatic lubricators were installed where applicable to reduce the more frequent application periods and to conserve lubrication personnel time. Troublesome systems were carefully cleaned using special Mobil flushing techniques.

Clinics were conducted for maintenance, repair and other personnel. Special devices were used to permit quick connection of couplings to portable filters; high-volume pumps reduced time in changing reservoirs; improved grease-gun loading equipment was adopted. A definite leakage control program was adopted to balance lubricant cost against leakage. Steps were also taken to correct individual problems that consume excessive personnel time.

The system works. Today, three years later, the impressive benefits on the opposite page have been chalked up. The reduction in maintenance costs over this period totals several hundred thousands of dollars.

Three important conclusions can be drawn from this work:

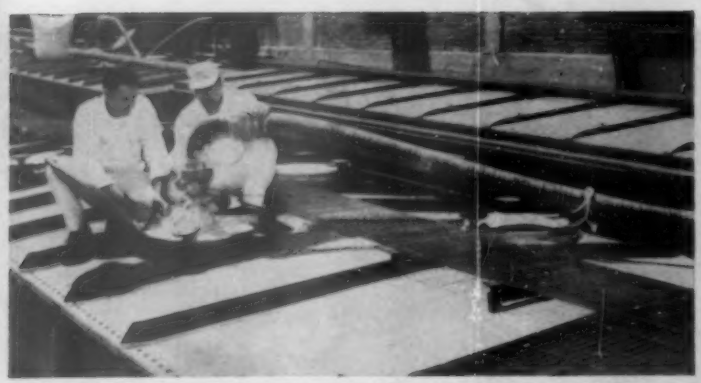
1 The outstanding success of this achievement reflects the progressive Pratt & Whitney attitude that has led to distinguished accomplishment in many technical fields.

2 Mobil, with the largest and most experienced technical lubrication staff, is best equipped with the engineering manpower necessary to help customers do this kind of a pioneering job.

3 Properly programmed, data processing control offers tremendous possibilities for cost reduction in industrial lubrication and maintenance.

IF YOU HAVE COMPUTER TIME AVAILABLE... AND A PLANT OR FLEET THAT COSTS TOO MUCH FOR MAINTENANCE... IT WILL PAY YOU TO CONSULT MOBIL.

SARDINES SWIM aboard boat with an assist from B.F.Goodrich suction hose. A special soft rubber lining guarantees the thin-skinned swimmers a bruise-free passage. Taking aboard a ton of sardines a minute with hose is twice as fast as hauling in heavy nets by hand and shoveling fish into the hold.



FLOUR BLOWS through hose into a special railroad car. The light, easy-to-handle B.F.Goodrich hose is a cinch to operate. Hook it to a hatch, turn on the blower, and flour speeds through at 800 pounds a minute. Each car loaded this way by a Nebraska miller saves some bakery the $250 it would cost if the flour were delivered in 100-pound bags.

CEMENT ROARS through hose as it is loaded aboard a river barge. The wear-and-tear of abrasive particles wore out one hose in only two months. Then a BFG hose, lined with the toughest wear-resisting rubber known, was tried. It's still on the job after 15 months, and a half-million barrels of cement handled.

You can't imagine all the stuff that blows, flows, swirls, swims, rushes, roars, gushes and pours through B.F.Goodrich hose

Seems like nearly every time we turn around someone thinks of something new for hose to do.

Take sardines. Commercial fishermen used to haul heavy nets over the side of the boat by hand, then shovel fish into the hold. Then a Maine canner got the idea that maybe fish could be taken aboard by hose. B.F.Goodrich designed a light, flexible hose that picks up fish like a vacuum cleaner.

A manufacturer needed a hose to handle broken glass. BFG developed it. Now it's used in scores of places for transporting brick chips, sawdust, coal and the like.

B.F.Goodrich makes hose to carry almost anything—from blasts of air to torrents of water, for scalding steam, corrosive chemicals, abrasive sand. And when a customer needs something new, we go all out to develop a hose that'll do the job—which explains why today *BFG makes more different kinds of hose than anybody.*

Your nearby B.F.Goodrich distributor can explain the different types of hose we make, tell you what to expect from each, help you decide which is your best buy. *B.F.Goodrich Industrial Products Company, Department M-140, Akron 18, O.*

HOT, CORROSIVE ACID SWIRLS through B.F.Goodrich hose at a Massachusetts plant manufacturing dyes and finishes for fabrics. The acid is so strong it eats its way through regular rubber hose, causing dangerous, costly leaks. But this acid hose, by BFG, is lined with a new rubber compound that can stand even the most corrosive acids and chemicals.

B.F.Goodrich

Good Government is a habit...

in pace-setting North Carolina

When Factory Magazine selected its recent Top Ten plants of the year, *two* North Carolina plants were in this elite group.

Both of these plants are examples of confidence in the future and opportunity for their operations in North Carolina. It's a dynamic state with fiscal integrity, equitable taxes and a constitution that prohibits deficit spending.

To learn more about North Carolina's greater opportunities for industry, write or call Governor Terry Sanford, Raleigh. You can do so in confidence.

GO NORTH CAROLINA

...where Good Government is a Habit and Greater Opportunity a Fact.

 For more facts Circle 415 on Reader Service Card **Circle 416 on Reader Service Card for items on next page**

TRAMBEAM® CUTS COSTS BY KEEPING PRODUCTS *ON TRACK*

Here's how The Louis Allis Company—a major motor manufacturer—handles varnish coating of massive stators and stator coils. Units come into the dip tank section shown above from any one of a battery of ovens and from any other part of the plant.

Two transfer cranes, one with a lift section, and connecting spur tracks interlock the entire area into a smoothly operating, trouble-free materials handling unit. No manual, time consuming re-handling of material is required. The product is always ON TRACK with Trambeam.

Trambeam is completely compatible with all other methods of materials handling. Why not have a Whiting man tell you how it can cut costs by reducing wasted effort in your plant? Write: Whiting Corporation, 15689 Lathrop Ave., Harvey, Ill. In Canada: Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.

Ask for your copy of Whiting's latest Trambeam bulletin—M-34

See our catalog in Sweets

90 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

TRAMBEAM®

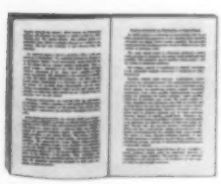
WHITING

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL PROCESSING EQUIPMENT

That odor you smell is money escaping!

The odorous fumes coming from your plant stacks are probably costing you much more than the good will of your employees and neighbors. For these odors often represent a wasted asset . . . a missed opportunity to lower your costs . . . through conversion of fumes to BTU's for use in processing, plant heating, paint drying or other operations.

Thousands of installations . . . covering plants and waste gases of many types . . . have proven the economy and feasibility of using objectionable organic or other combustible waste gases and vapors as money-saving fuels through Catalytic Combustion. In this proven process, all-metal catalysts and catalytic systems oxidize these gases by *low temperature, flameless combustion* . . . to give you usable energy and a low temperature, odorless and colorless discharge from your stacks. Incidental benefits often include reduced fire hazards, simplified cleaning maintenance, healthier working conditions . . . and better community relations.



For more details *on the economies possible write Dept. E for this brochure. Or, give us a few facts on your waste gas problem so we can make specific suggestions.*

CATALYTIC COMBUSTION CORPORATION
4725 Fourteenth Street • Detroit 8, Michigan
A SUBSIDIARY OF UNIVERSAL OIL PRODUCTS COMPANY

For more facts circle 417 on Reader Service Card

BUILDINGS UNPRECEDENTED

by Butler, of course

Designed by James John Derks, Architect, Chicago

Never before such beautiful, efficient industrial buildings for so little money

When you invest in a new industrial building, your first practical consideration is cost; the effect on your capital. Then, the building's influence on your operation. Last, but not least, reaction of people to the building. It has to please customers and clients, has to please the community in which you locate.

New Butler Buildings are truly unprecedented in all these respects. Beautiful work buildings! Beautiful buy! Beautiful public relations tools!

The re-designed new Butler line offers tremendous variety. Over 400 basic designs, in many sizes. Interchangeable components with exciting design variations. Bold new contemporary profiles. Handsome new wall systems, never before seen on pre-engineered buildings. Subtle new colors and shades. Elegant, tailored trim, doors and windows, all design-integrated to give structures a perfectly finished look.

No other pre-engineered building system puts so much emphasis on appearance. No other buildings are so completely factory fabricated. Naturally, this factory fabrication results in an end product that looks better in every detail. A more efficient, durable building, too. It's the lowest-cost way to build well.

Phone your Butler Builder for the full story. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings." Ask about financing, too.

Write for Butler's full-color booklet, "Buildings Unprecedented."

BUTLER

BUTLER MANUFACTURING COMPANY

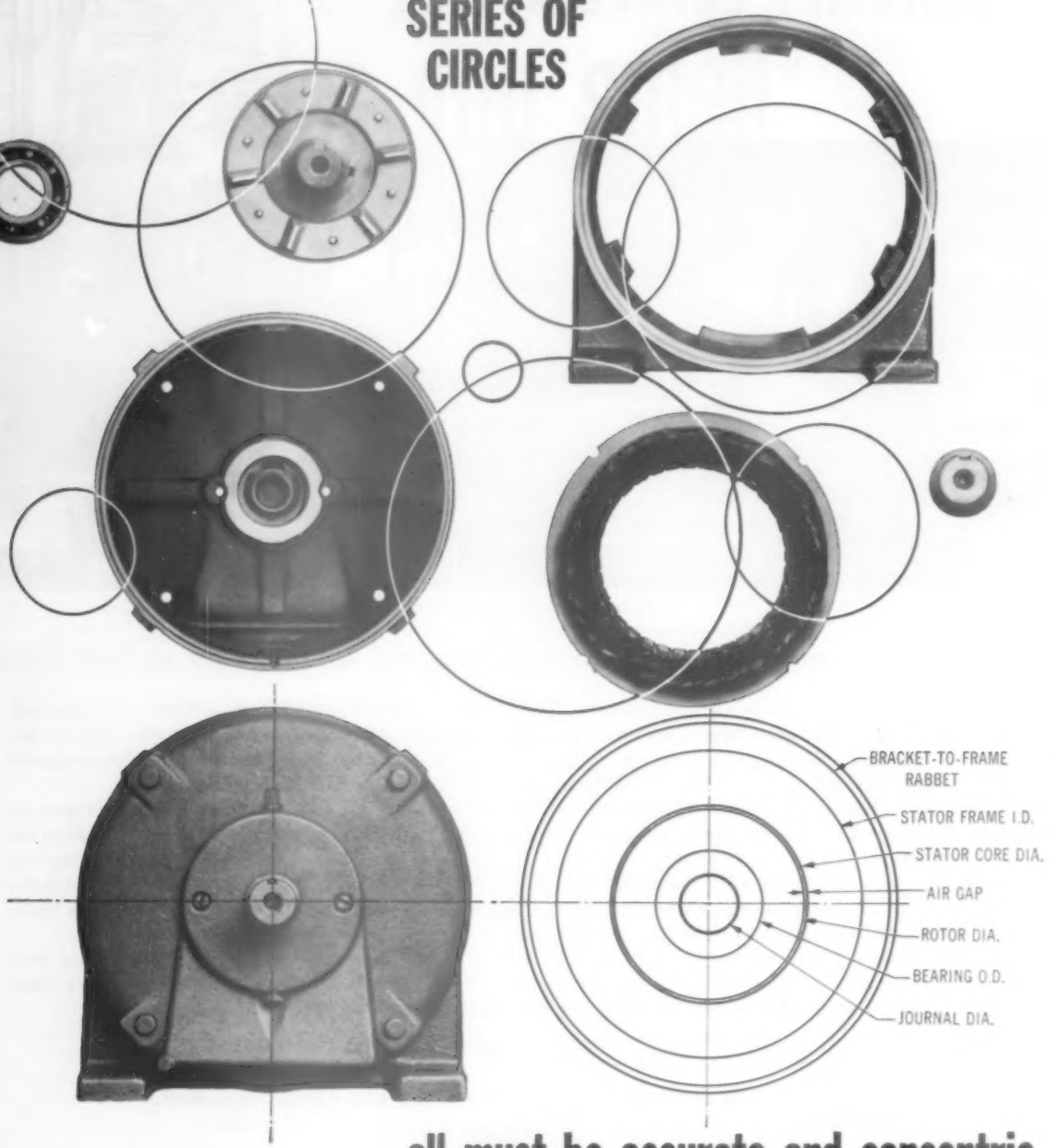
7375 EAST 13TH STREET, KANSAS CITY 26, MISSOURI

Manufacturers of Metal Buildings • Plastic Panels • Equipment for Farming, Transportation, Bulk Storage, Outdoor Advertising • Contract Manufacturing

Architect / Richard J. Weibel and Associates, Erie, Pennsylvania

Architect / Zay Smith and Associates, LaGrange, Illinois

A MOTOR IS A SERIES OF CIRCLES



all must be accurate and concentric

In manufacturing Elliott Crocker-Wheeler motors, a dozen critical "circles" are formed accurately and concentrically through unique and extraordinarily precise production methods. The result is exact alignment of all parts, true and uniform air gap, free-spinning rotor, quiet, cool, dependable operation.

■ ***Elliott Crocker-Wheeler integral-hp a-c and d-c motors—from smallest to largest—are offered in all conventional enclosures and modifications; with insulation to suit the application, including EPA SEAL epoxy insulation for use where conditions are most severe.***

W1-9

ELLIOTT COMPANY

GENERAL OFFICES: JEANNETTE, PENNSYLVANIA

PLANTS AT: Jeannette and Ridgway, Pa.; Springfield, Ohio

TURBINES · GENERATORS · MOTORS · COMPRESSORS · TURBOCHARGERS · EJECTORS · STRAINERS · TUBE CLEANERS

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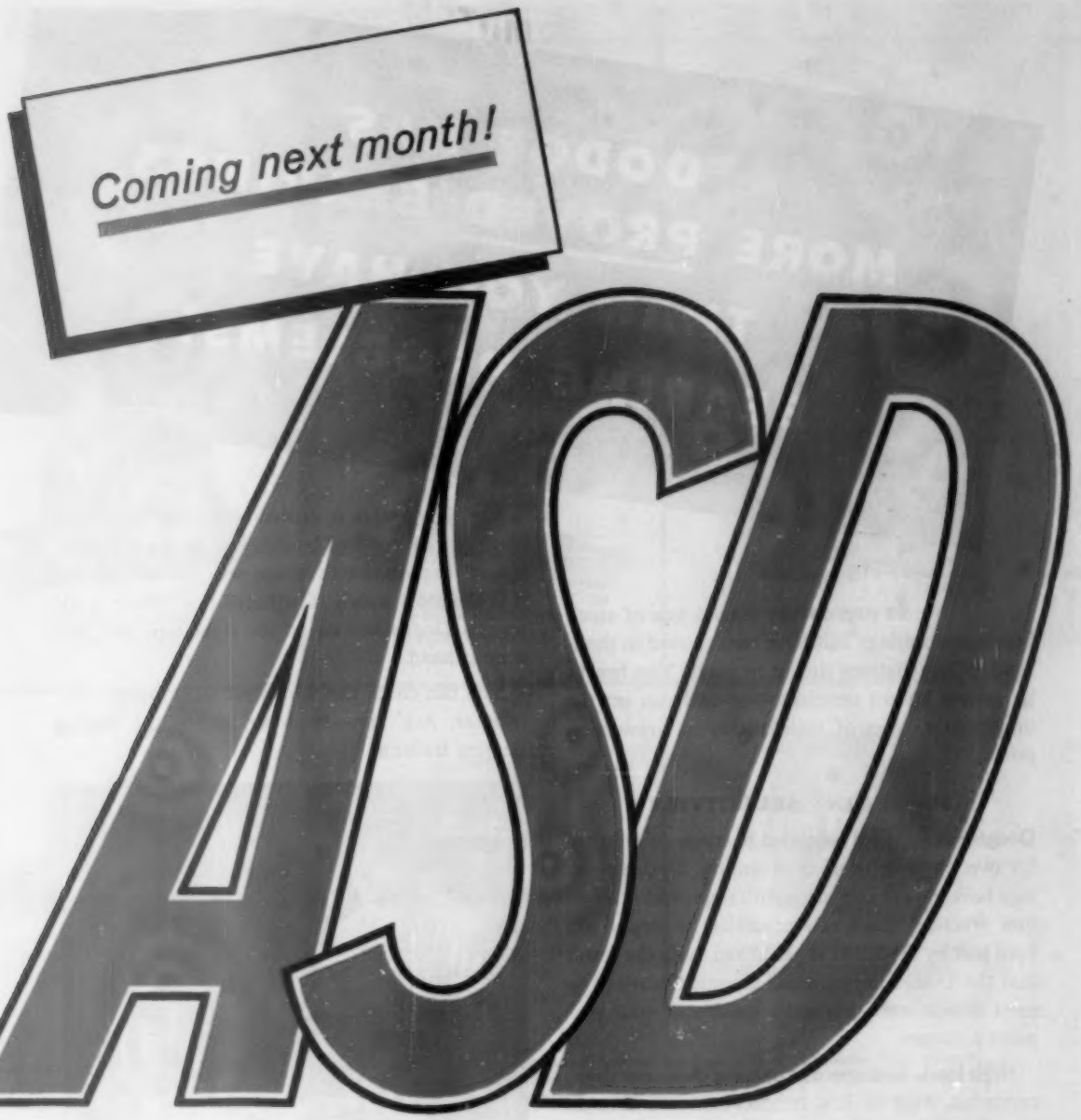


A new concept in lift truck design
with dramatic advantages for both owners and drivers

Ask your
AUTOMATIC dealer
for advance information.

AUTOMATIC®

A Division of The Yale & Towne Manufacturing Company
39 W. 87th St., Dept. T1, Chicago 20, Illinois

For more facts Circle 420 on Reader Service Card

DODGE HAS MORE PROVED BEARINGS THAN YOU HAVE BEARING PROBLEMS!

It pays to buy from a line of stock bearings—bearings that have been proved in thousands of installations similar to yours. You benefit by getting known dependability; and you get the important savings of high quality at production price.

PIN-POINT SELECTIVITY

Dodge has supplied mounted bearings to industry for over three-quarters of a century. Dodge bearings have always kept pace with improved production practices. Each new condition of service has been met by Dodge as it has arisen, with the result that the Dodge line contains mounted bearings to meet almost every service requirement with pin-point accuracy.

High load, high speed, excessive dust, moisture, corrosion, high or low temperatures, continuous operation—you name it!—such conditions and their combinations are met every day with Dodge bearings.

BROAD LINE—WIDELY DISTRIBUTED

In the great variety of mounted bearings developed by Dodge, you will most likely find the precise unit to fit your requirements ideally—without paying for features you do not need. And if your requirements call for several types of bearings, there is an advantage in having them of common design, such as Dodge offers.

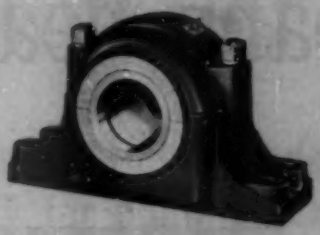
The Dodge line is probably broader than any other line of mounted bearings in America. And of special importance to machinery manufacturers, it is the most widely distributed line. There is always a Dodge bearing of the right type and size near at hand.

You can check this with your local Dodge Distributor. Ask him—or write us for the Dodge Bearing Bulletin.

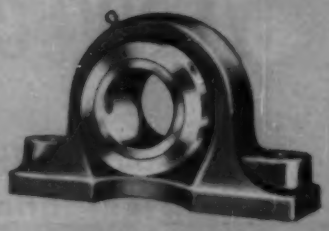
In addition to tapered roller, spherical roller and ball bearings, Dodge builds many types of sleeve bearings. Here is the "large and small" of the sleeve type bearings carried in stock—ranging from an 8-in. Sleevoil weighing over 1200 lbs. to a ½-in. solid journal bearing weighing 9 ounces.

DODGE MANUFACTURING CORPORATION, 400 Union Street, Mishawaka, Indiana

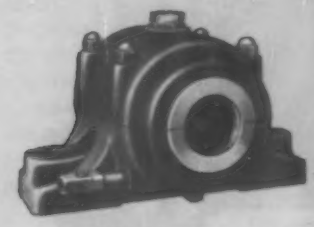
DODGE PILLOW BLOCKS WITH TIMKEN TAPERED ROLLER BEARINGS



DODGE SPHER-ALIGN PILLOW BLOCKS WITH SPHERICAL ROLLER BEARINGS



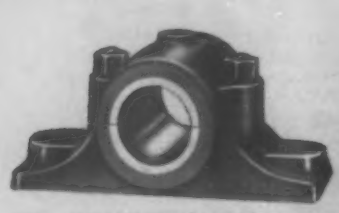
DODGE BALL BEARING PILLOW BLOCKS



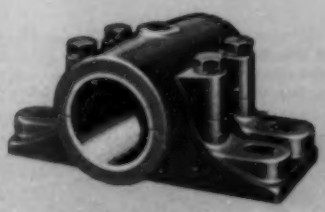
DODGE SLEEVOIL PILLOW BLOCKS

DODGE BRONZOIL PILLOW BLOCKS

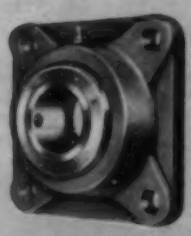
DODGE BRONZE BUSHED PILLOW BLOCKS



DODGE JOURNAL BEARINGS SOLID AND SPLIT



DODGE HEAVY RIGID PILLOW BLOCKS



FLANGE BEARINGS: HANGER BEARINGS: BEARING UNITS: TAKE-UPS

● **Dodge Pillow Blocks with Timken Tapered Roller Bearings.** America's quality pillow blocks. Assembled, lubricated, adjusted and sealed at the factory. 5 types for varying needs.

● **Dodge Spher-Align with Spherical Roller Bearings.** Rugged heavy duty, compact, inherently self-aligning. Exclusive Micro-Mount simplifies installation.

● **Dodge Ball Bearing Pillow Blocks.** Deep groove ball bearings with long inner races—high capacity. SL, SC and SCM models for light, normal and medium service respectively.

● **Dodge Sleevoil Pillow Blocks.** Ultra quality . . . extra long life . . . accessibility . . . *quiet*. Plain or water-cooled.

● **Dodge Bronzoil Pillow Blocks.** Efficient, low cost pillow blocks with self-oiling, capillary bronze bushings. Self-aligning. Large oil reservoirs.

● **Dodge Bronze Bushed Pillow Blocks.** Quiet fan and blower pillow blocks with two bronze bushings of high lead content mounted in one cast iron housing.

● **Dodge Journal Bearings — Solid and Split.** True running, dependable. Babbitted bearings with precision machined bores and faces. Finished bases.

● **Dodge Heavy Rigid Pillow Blocks.** Rugged, carefully bored, babbitted pillow blocks for many applications requiring grease lubrication. Finished bases and ends.

● **Bearing Units.** A wide variety—spherical seat, cartridge, flange, hanger, screw conveyor hanger, take-up. Ball, Roller and Sleeve types.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."

DODGE

of Mishawaka, Ind.

AAF cleans, heats, moves ai

A battery of AAF dry-type dust collectors exhausting grinding operations. After-cleaners on collectors provide for re-circulation of cleaned air.

AAF packaged central station air handling units, suspended from the ceiling in the warehouse, save valuable space, provide quiet operation.

AAF

AIR CLEANING PRODUCTS
Air Filters
Dust Collectors

AIR CONDITIONING, HEATING & VENTILATING PRODUCTS

AAF electronic air cleaners provide clean air for the Maytag Headquarters Building, Newton, Iowa. Architects: Brooks-Borg, Des Moines. Air Conditioning Engineer: William Nanes, Des Moines.

COMPLETELY CONDITIONED AIR

ato make it work for Maytag

Multi-product installation demonstrates AAF's capability for complete air engineering

THE manufacture of major appliances demands that air be put to work in many different ways. Here are the jobs it had to do at the Maytag office and plants in Newton, Iowa: (1) help keep the interior of the impressive new headquarters building perpetually clean, (2) control dust from grinding operations, (3) provide heating and ventilating for the warehouse and service repair area, (4) control dust from polishing operations, (5) provide proper exhaust from plant and processing operations, and (6) help provide a dust-free atmosphere in the enameling department.

AAF is the only company that provides *all* the major components for *completely* conditioned air. Just as important, AAF offers the knowledge and experience to coordinate the functioning of these components into one integrated system.

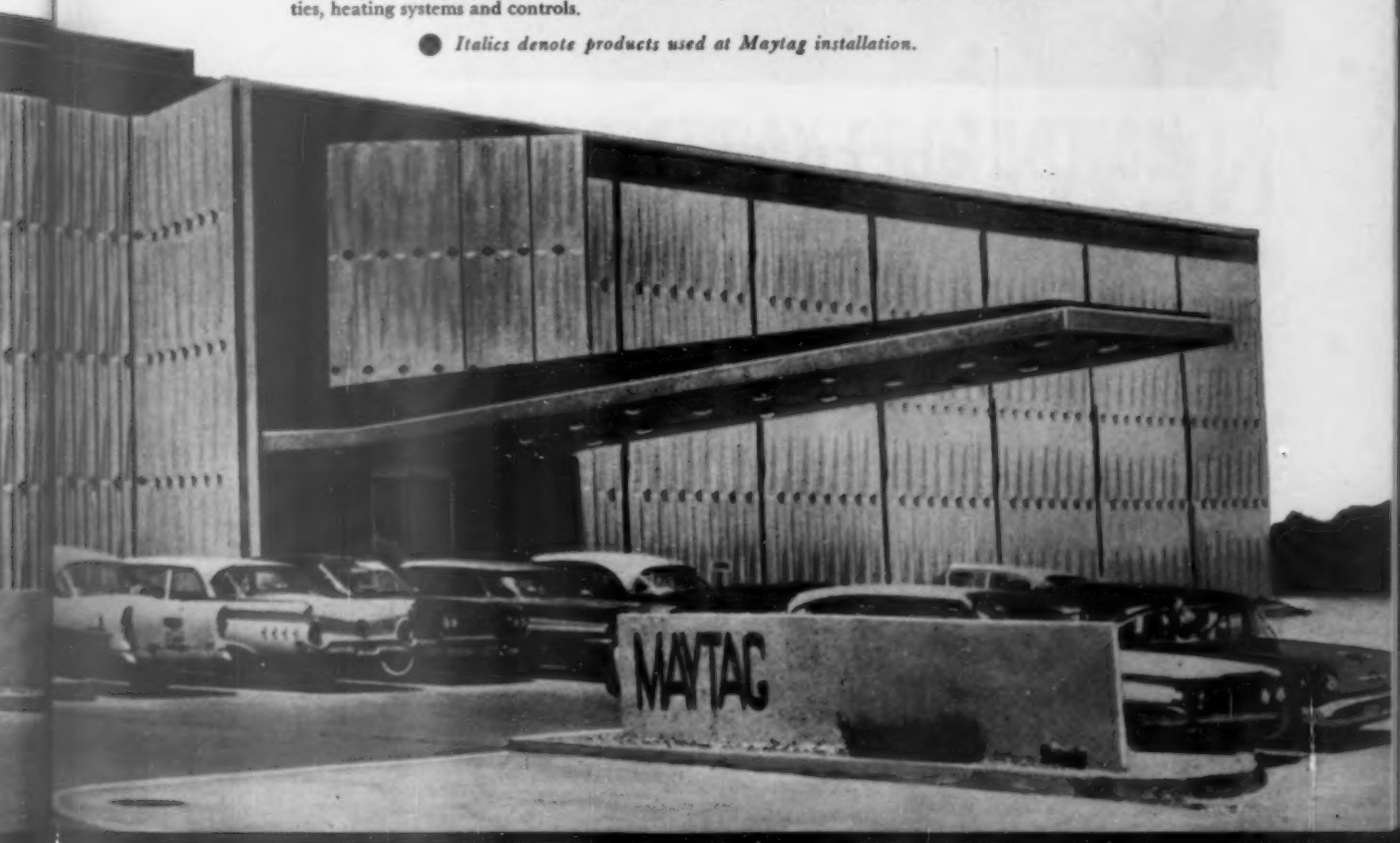
If air must do many jobs in the building you are planning, talk with AAF. Booklet 518 describes the complete line of AAF component products. If you would like a free copy, address Richard W. Smith, American Air Filter Company, Inc., 361 Central Ave., Louisville, Ky. In Canada: American Air Filter of Canada, Ltd., 400 Stinson Blvd., Montreal 9.

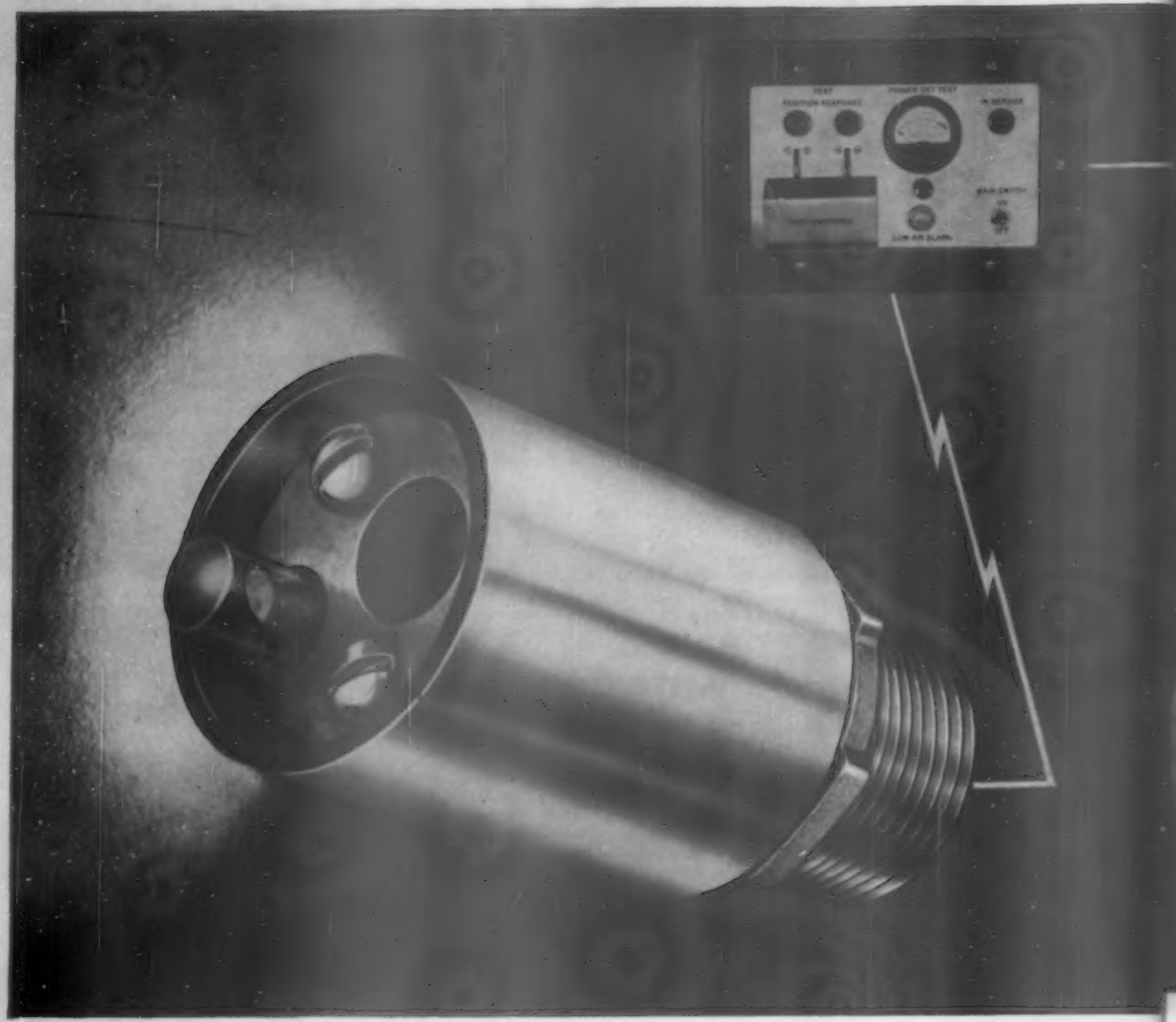
AAF **American Air Filter**

BETTER AIR IS OUR BUSINESS

AIR CLEANING: (Atmospheric Dust) *AAF electronic air cleaners, automatic air filters, unit filters,* engine & compressor filters. (Process Dust) electrostatic precipitators, *wet-type collectors, dry-type collectors,* fabric arresters. AIR CONDITIONING, HEATING & VENTILATING: Herman Nelson air conditioning unit ventilators, unit ventilators, portable heaters; Kennard/Nelson dual-duct air conditioning units, multi-zone air conditioning units, *packaged central station air handling units,* sprayed-coil dehumidifiers, fan-coil units, packaged liquid chillers, cooling towers, evaporative condensers, direct-expansion coils, water coils, steam coils, *unit blowers,* industrial exhausters, *centrifugal fans, unit heaters,* radiation products; Illinois traps, valves, specialties, heating systems and controls.

● *Italics denote products used at Maytag installation.*





NEW! SPEED-OF-LIGHT FIRE DETECTION WITH GRINNELL'S NEW PRIMAC

New Grinnell system detects fire in milliseconds . . . offers ultra-high-speed protection where solid propellants, other materials present special hazards

Manufacture and use of solid propellants present special fi hazards. Fire protection must be ultra *fast*, if it's to be effective

Grinnell's Primac fire-control system operates in millisecond A photosensitive cell picks up the first light from a fire . . . tran mits a signal that actuates the new Primac water-control val

FACTORY

PLUS FASTEST-ACTING SPRAY PROTECTION FIRE-CONTROL SYSTEM

. . . and strategically-placed nozzles spray water over the blaze. It's the fastest fire protection system ever devised!

If you work with solid propellants — or *any* material that demands ultra-high-speed fire control — Grinnell's new Primac system can give you the protection you need. Each Primac system is specifically designed to fit a particular application. Write for information, to Grinnell Company, Inc., Providence 1, R. I.

GRINNELL

AUTOMATIC SPRINKLER FIRE PROTECTION SINCE 1878

For more facts Circle 423 on Reader Service Card

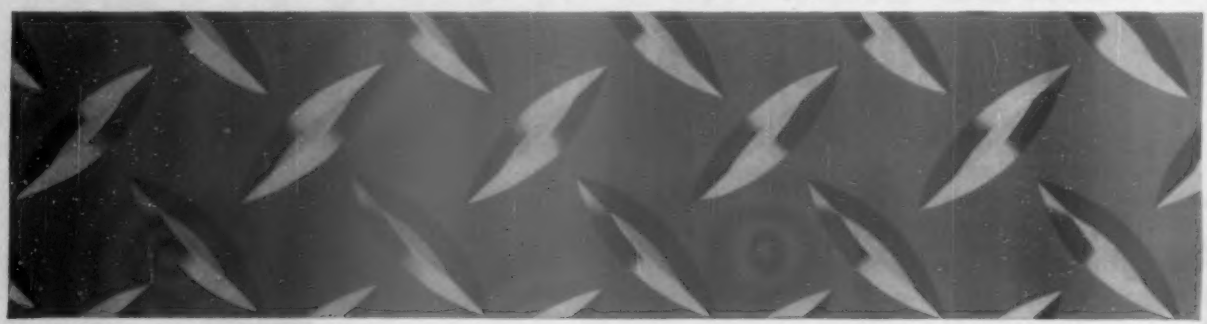
Shear, form or weld A.W. Super Diamond with standard shop equipment. Pattern matches any angle.

SUPER DIAMOND

Sweep, hose or mop A.W. Super Diamond. Water drains off in all directions. No pockets to hold dirt.

FLOOR PLATE

Reduces slides and slips. Super Diamond puts safe footing on steps, ramps, aisles; aids traction even if wet.



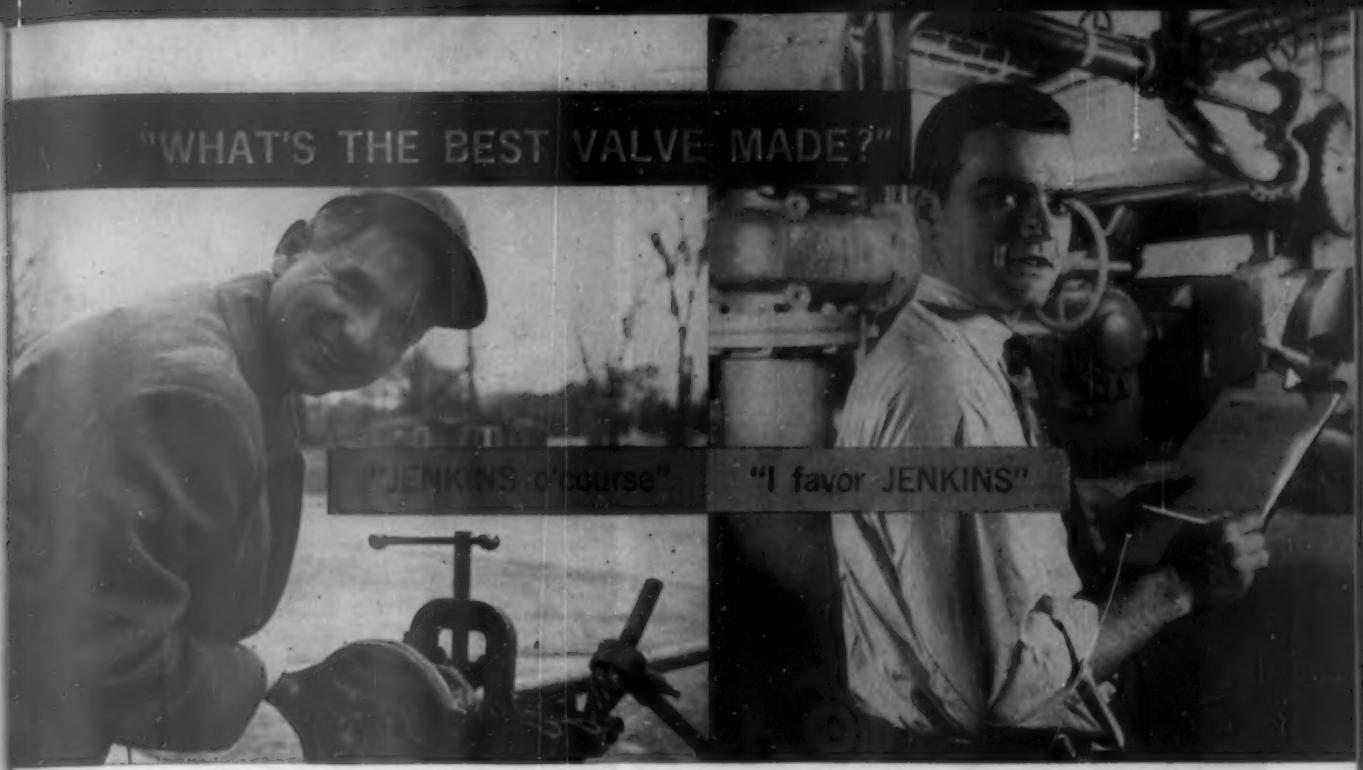
Write for Bulletin SD-S10

ALAN WOOD STEEL COMPANY

Conshohocken, Pa. • STEEL PRODUCERS WITH THE CUSTOMER IN MIND

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta
Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle
Montreal, Toronto and Vancouver, Canada: A. C. Leslie & Co., Ltd.

For more facts Circle 424 on Reader Service Card **Circle 425 on Reader Service Card for items on next page**

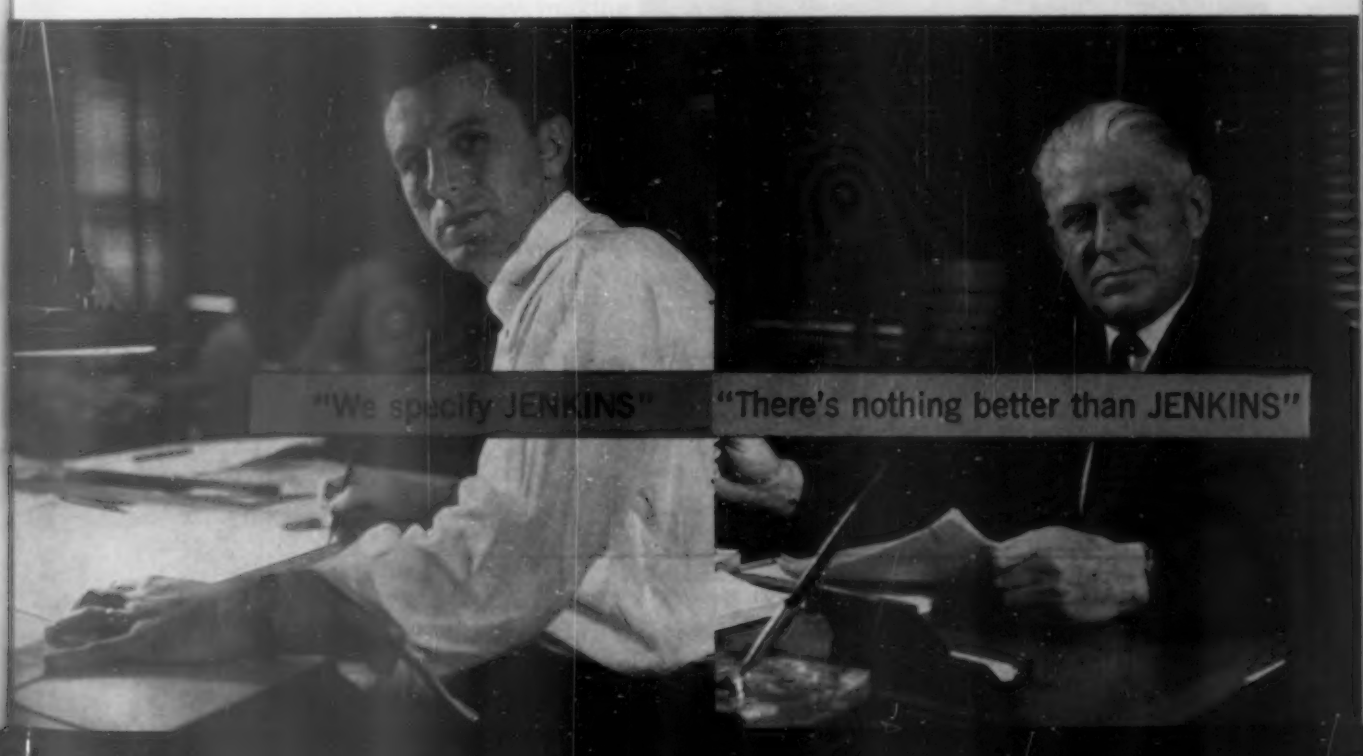


Trusted by Everyone

JENKINS VALVES and the Supply Service of

the local JENKINS DISTRIBUTOR

When you deal with the local Jenkins Distributor, you get the protection of a DOUBLE ASSURANCE of satisfaction: Valves of unexcelled quality and supply service of the highest caliber. Only the most competent distributors are selected by Jenkins Bros. to be the local sales and service facilities for Jenkins Valves. They have the stock, know-how and integrity to justify your full confidence. You'll find it good business to deal with your local Jenkins Distributor ...an important part of Jenkins Bros.



5 Basic Strapping Questions...

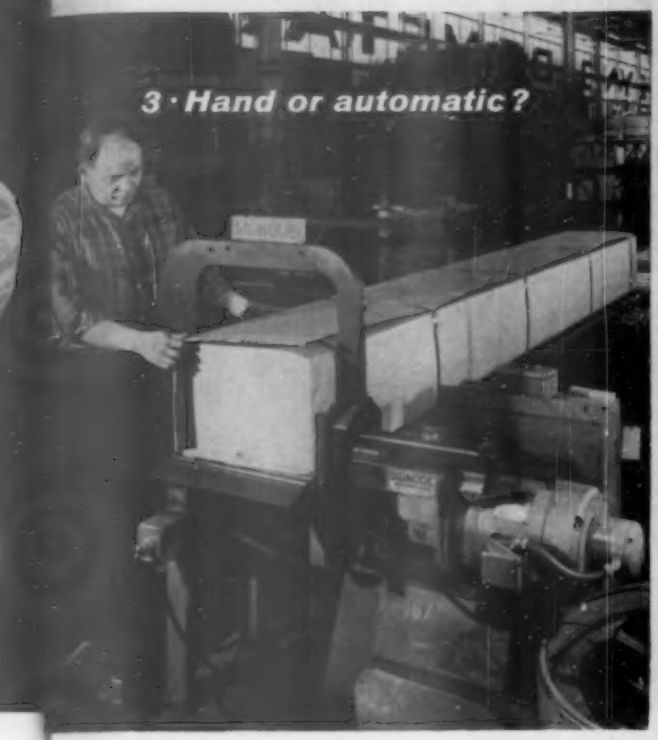
1. **Where do you put the straps and how many should you use?**

2. **What kind and size of strapping is best for the application?**

3. **Should you use hand tools, power tools, or automatic strapping machines?**

4. **Would a simple jig or fixture help?**

5. **How should the work, the material flow, the tools, and the equipment be arranged?**



Wrong answers are costly... right ones are free

If you have the right answers to these five questions, chances are that steel strapping is saving you money, making your products cost less to handle, ship, store, and receive.

But will those answers stay right? Your business does not stand still, any more than ours does. New products, new packages, new methods, new customer demands come along. Yesterday's right answers may be today's wrong ones.

You need right answers *on a continuing basis*—and you get them free from Signode, with the help of—

- trained packaging and shipping specialists.
- the widest selection of hand and power strapping tools and automatic strapping machines.
- the most complete testing and engineering facilities.
- 48 years of experience in solving packaging, handling and shipping problems.

Why settle for less? For right answers, call the Signode man near you, or let us put him in touch with you.

SIGNODE

First in steel strapping

SIGNODE STEEL STRAPPING CO.

2663 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast, Foreign Subsidiaries and Distributors World-Wide

In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

For more facts Circle 426 on Reader Service Card

THE TRINISTROL WORLD'S MOST **EXPENSIVE** POWER SWITCH

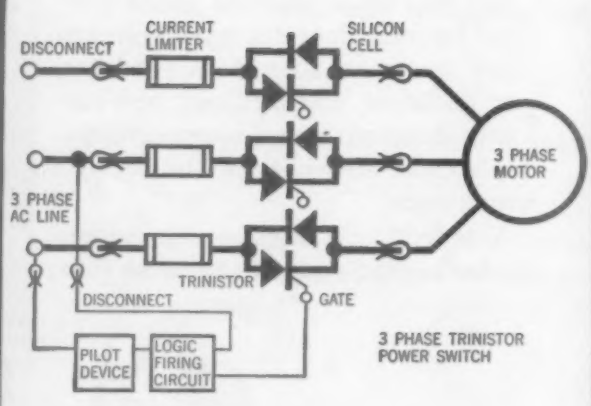
a new all-static control device that virtually eliminates downtime. Quickly pays for itself by eliminating costly production delays.

THE TRINISTROL WORLD'S MOST **RELIABLE** POWER SWITCH

for high duty-cycling—no mechanical contacts to wear, pit, corrode or bind. Ideal for remote stations and long stand-by service.

THE TRINISTROL WORLD'S MOST **PRACTICAL** POWER SWITCH

offers high level power handling with low level input. Can be operated directly from a computer, thermistor or static switch.



FACTORY

THE TRINISTROL WORLD'S MOST **VERSATILE** POWER SWITCH

starts motors, or heating elements. Has almost instant response: Time lag in milliseconds vs. conventional 6 to 20 cycle delay.

THE TRINISTROL WORLD'S MOST **QUIET** POWER SWITCH

. . . you hear absolutely nothing. Perfectly suited for military, naval and sound studio applications. Meets MIL A 21360 requirements.

THE TRINISTROL WORLD'S MOST **RUGGED** POWER SWITCH

. . . completely shockproof and vibration-proof. Meets MIL S 901 and MIL S 167 requirements. Can be mounted anywhere.

Westinghouse develops man's nearest approach to a perfect power switch.

The Westinghouse all-static TRINISTROL* is practically infallible. Handles high duty-cycling with ease. Controls high level loads with a low level input. Even works directly from a computer in computer-controlled systems. The absence of mechanical contacts assures a completely silent, faultless operation over infinite periods. The all-static TRINISTROL is now available as a practical solution to the problems of mechanical wear, corrosion, and vibration for power switches and control applications. Entirely dependable after long stand-by service or during long periods of operation. If your down-time costs are high—if you strive for system perfection, you should learn more about the TRINISTROL static power switch. Write: Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. *You can be sure . . . if it's Westinghouse.*

*Trademark
J-25014

Westinghouse

For more facts Circle 427 on Reader Service Card

If you have anything to do with plant

take a good look at

Chances are you can get better lubrication... and save money in the bargain

To many people grease is an unglamorous and confusing subject. This is a shame, because grease is really a spectacular sort of lubricant. Nevertheless, people who don't understand it tend to forget it.

As a result, they run into all sorts of trouble. Sometimes they spend too much, buy the wrong thing, or misapply what they do buy. Sometimes they neglect to apply it at all.

True, a few years back, greases could be a headache, principally because in many cases the "right" grease simply didn't exist. To handle some of the tougher jobs grease-makers came up with the weirdest sort of concoctions. No wonder people put grease in the product-to-be-forgotten class.

But times have changed.

Grease-makers have found out a lot. They're making *better* products . . . and Sun's among the leaders in producing a full line of modern maintenance greases.

WHAT IS A GREASE?

It always pays to be sure you know what you're talking about. At least, asking such an academic question may bring to light some worthwhile points you've forgotten. Simply, a grease is a thickened oil. By his choice of thickener, a grease-maker can make a grease with high resistance to water, to high temperatures, or to both. By using additives and inhibitors he can get certain special properties, such as tackiness, high resistance to deterioration, and so on.

You might think of the thickener as a sponge that sops up oil, thus providing a means of keeping an oil *on the job.*

Greases come into their own wherever it's hard to keep oil where it belongs, or where it's impracticable to keep replacing oil that runs away.

You can't make a good grease with crankcase drainings. You must *start* with a very carefully chosen high-quality oil. The better oil makes the better grease.

WHAT MAINTENANCE GREASES ARE AVAILABLE?

There are several principal types: The work horses, made with calcium and sodium soaps, and the glamour greases, usually made with lithium soaps, and sometimes with other soaps or other kinds of thickeners.

Most greases come in several consistencies, or "thicknesses". How they stack up is best explained in the simple chart below.

WHAT ABOUT A SINGLE MULTIPURPOSE GREASE?

Despite what you may have been told, there is no such product. That is, there is no *single* consistency of a *single* type of grease that can handle *every* operating condition. This is the unvarnished truth.

		Handle Water?	OK For High Temperatures?	What Speeds & Loads?	Relative Cost
THE WORK HORSES	Calcium Soap Grease	YES	NO	ANY	LOW
	Sodium Soap Grease	NO	YES	ANY	LOW
THE GLAMOUR GREASES	Lithium Soap Greases & Others	YES	YES	ANY	HIGH

lubrication . . .

what's happened to grease

HOW TO MAKE UP YOUR OWN MIND

You're in luck here. Modern grease-makers are just as eager as you are to cash in on simplicity. So they're cutting down the number of greases they offer, and this makes grease selection simpler for you.

You can start yourself on the way to grease modernization by asking yourself just a few easy questions:

What do I want the most?

- Good lubrication?
- The economy of simplification?
- The economy of low initial costs?
- Or some combination of these?

Of course you want good lubrication. And this is *always* available, because today, somebody, somewhere, has the grease that will stand up to whatever working conditions you've got to handle. The grease you need exists.

So now you're down to the remaining questions: Simplification? Low initial cost? Or a combination? The chart at the bottom of this page tells the story.

HOW MUCH SIMPLIFICATION?

Sometimes you can simplify yourself into spending *more* money, not less. Just the same, most people buy too many greases.

Many plants can do quite well with a single maintenance grease. This is hard for many people to believe. But it can be done, economically, in an amazing number of plants. Yours may be one of these. Many plants, of course, need two or three greases, but rarely any more.

When you're simplifying, the trick's in knowing when to stop.

THE VITAL LAST STEP

Now . . . you need to go only one step farther: You need to find *products* that will handle *your* needs.

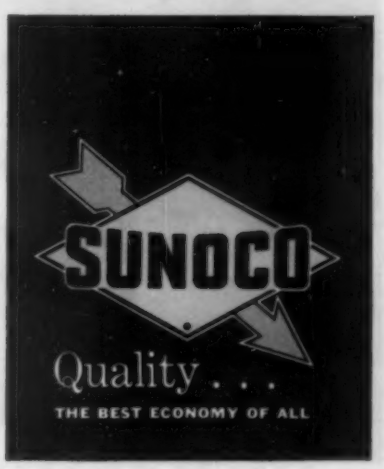
And you need *savvy*, to analyze your needs, to pick the best product mix, and to apply wisely the products you buy.

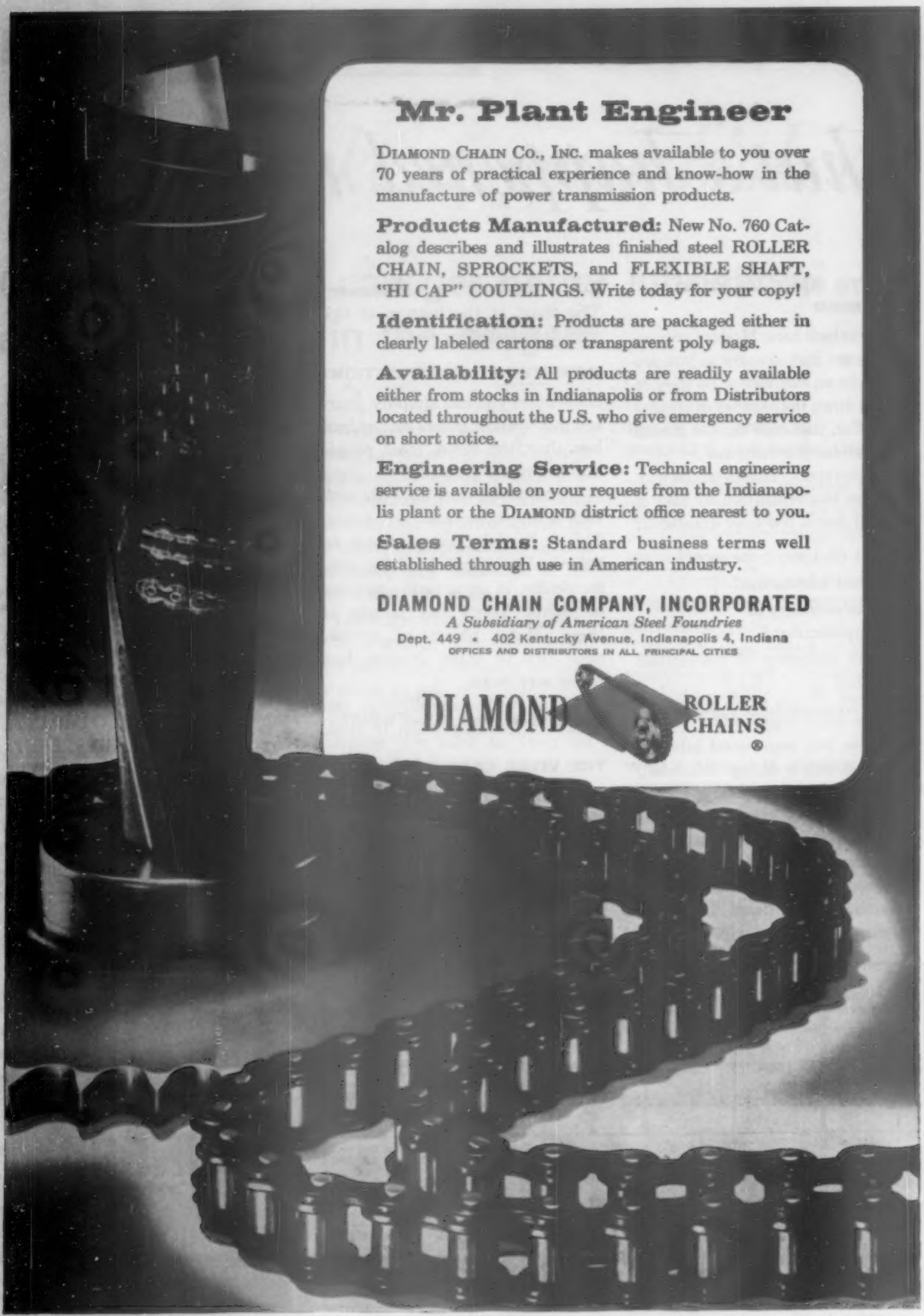
Again the answer's simple. Sun has the *products* and the *savvy*. If you're really interested in getting the most out of grease, your Sun man can help you. Call him. Put the challenge to him. Call him today and tell him that you want to talk grease.

TECHNICAL BULLETIN

If you're not disposed to talk, then you should ask for Sun's new Technical Bulletin 69. It gives complete information on all of the basic types of maintenance greases in a comprehensive, orderly fashion, and lists full details on the major greases Sun makes. For your copy write to: **SUN OIL COMPANY, Dept. F-10, 1608 WALNUT STREET, PHILADELPHIA 3, PENNSYLVANIA.** In Canada: Sun Oil Company Limited, Toronto and Montreal. Or call the Sun representative nearest you.

	Relative Grease Costs	Storage & Handling Costs	Chances of Failure Through Misapplication	REMARKS
Simplification?	HIGH	LOW	LOWEST	Usually, you'll need a glamour grease or two, and this will increase grease costs. This is not necessarily true in plants with narrow ranges of operating conditions or where you don't **need** one grease to handle, for example, high temperatures **and water**. In these cases you can often achieve simplicity by using one or two modern calcium or sodium greases in place of half a dozen.
Low initial costs?	LOW	HIGH	HIGHEST	When you have no condition that **requires** glamour greases, you can use moderate-cost calcium and sodium greases. This keeps grease costs down, but they can be overbalanced by higher storage and handling costs. Failures from misapplication are also more likely.
Combination of simplification and low initial cost?	MODERATE	MODERATE	MODERATE	Just about always the best solution. The bigger the plant, the more varied the needs, the more important a compromise becomes. Of the three, this is the hardest course to chart; to follow it wisely, expert advice is a must.





Mr. Plant Engineer

DIAMOND CHAIN CO., INC. makes available to you over 70 years of practical experience and know-how in the manufacture of power transmission products.

Products Manufactured: New No. 760 Catalog describes and illustrates finished steel ROLLER CHAIN, SPROCKETS, and FLEXIBLE SHAFT, "HI CAP" COUPLINGS. Write today for your copy!

Identification: Products are packaged either in clearly labeled cartons or transparent poly bags.

Availability: All products are readily available either from stocks in Indianapolis or from Distributors located throughout the U.S. who give emergency service on short notice.

Engineering Service: Technical engineering service is available on your request from the Indianapolis plant or the DIAMOND district office nearest to you.

Sales Terms: Standard business terms well established through use in American industry.

DIAMOND CHAIN COMPANY, INCORPORATED

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DIAMOND ROLLER CHAINS ®

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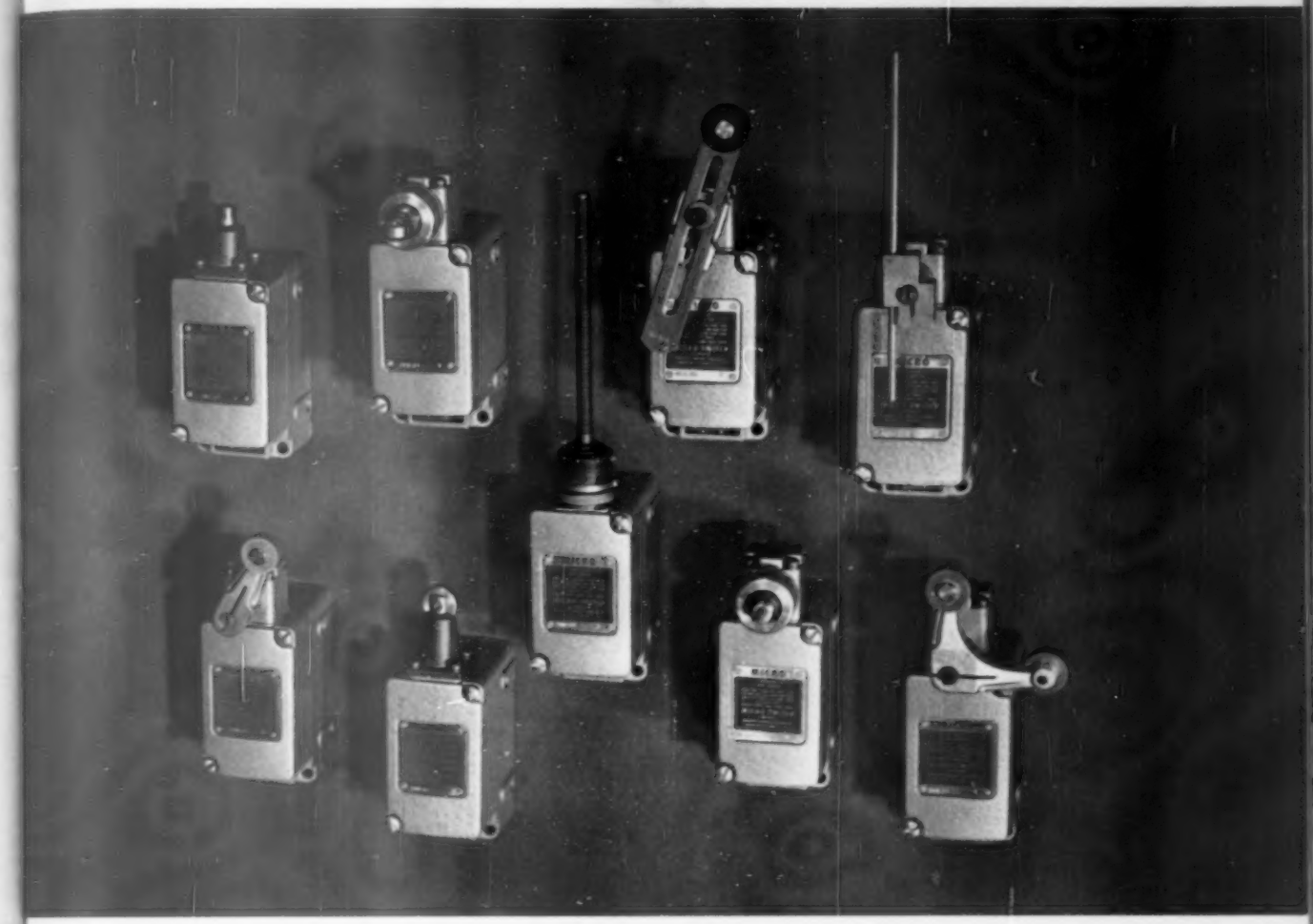
MICRO SWITCH Precision Switches



Cut downtime to 20 seconds with

MICRO SWITCH "Plug-in Limit" Switches

The terminal block, permanently mounted, has no parts to wear out. The actuator-switch assembly plugs in like a radio tube.

The oil and liquid-tight seals and the wear resistant qualities of "200LS" snap-action limit switches make them ideal for use as dependable long-life safeties, limits and interlocks in the most severe industrial applications.

Spring plugs integrally molded into the precision snap-action basic switch in the actuator assembly plug into the integrally molded terminal receptacle. Two captive screws and a ring gasket seal the two units together.

Nine standard and many special actuators are available. The basic switches are two-circuit double break. Actuator heads are adjustable to four positions and the terminal blocks may be mounted from the side or back, providing extreme versatility for changing production requirements.

For further information, see the Yellow Pages for the nearest MICRO SWITCH branch office or distributor or write for Catalog 84.

MICRO SWITCH ... FREEPORT, ILLINOIS ... A division of Honeywell

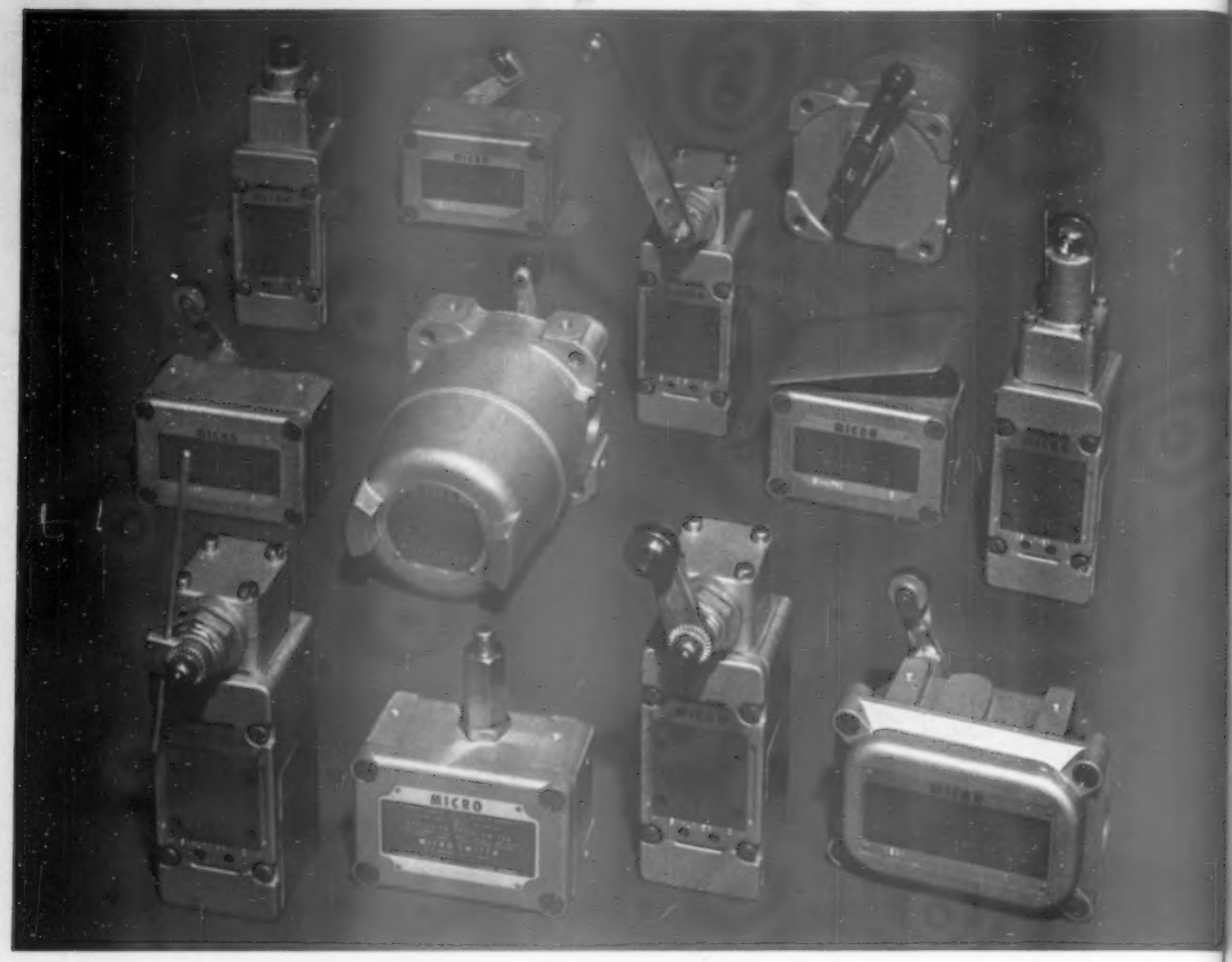
In Canada: Honeywell Controls, Limited, Toronto 17, Ontario

Honeywell

MICRO SWITCH Precision Switches

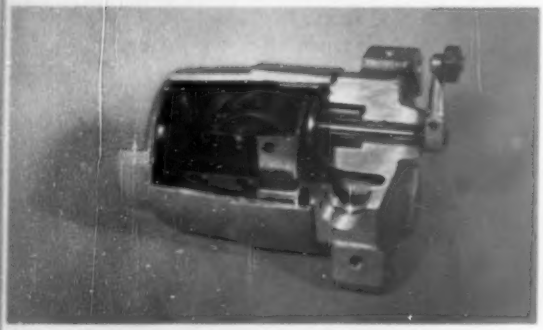
HONEYWELL INTERNATIONAL

Sales and service offices in all principal cities of the world. Manufacturing in the United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.



Added safety for switching in danger areas

EXPLOSION-PROOF Switches



"CX" series explosion-proof switches are rain and dust tight—valuable protection in hazardous outdoor locations. Note the two gasket seals and the accessibility for wiring to the two enclosed s.p.d.t. switching units.

MICRO SWITCH explosion-proof switches provide safe limit or interlock control functions in hazardous areas where there is danger of explosion of dust or volatile vapors. They are designed for heavy duty performance under the most severe operating conditions. The enclosed and well protected snap-action basic switching elements combine precision with long life.

All switches in this family are listed by Underwriters' Laboratories for use in hazardous atmospheres Class I, Groups C and D; Class II, Groups E, F and G. Some are also listed for Class I, Group B.

Available with a variety of actuators, circuit arrangements, electrical ratings, and operating characteristics.

See the Yellow Pages for the nearby MICRO SWITCH branch office or distributor, or write for Catalogs 83 and 84.

MICRO SWITCH . . . FREEPORT, ILLINOIS . . . A division of Honeywell

In Canada: Honeywell Controls, Limited, Toronto 17, Ontario

Honeywell

MICRO SWITCH Precision Switches

HONEYWELL INTERNATIONAL

Sales and service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

$100 REWARD

WANTED:
THE "OLDEST" HANNA CYLINDER

Hundreds of Hanna air and hydraulic cylinders built years ago are still in use. This year Hanna Engineering Works celebrates its 60th year as a manufacturer of air and hydraulic equipment. *You* can win a reward by finding one of the oldest, operating Hanna cylinders.

WHERE TO LOOK

Perhaps the oldest Hanna cylinder has seen service on several jobs around your plant. Frequently, when one job is finished, a Hanna cylinder will be moved to another job, because the cylinder still works as good as new. The oldest Hanna cylinder is typical of all Hanna cylinders built since—tough, sturdy, long lasting, built to take it.

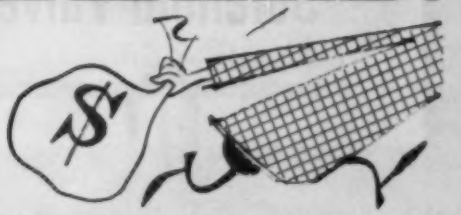
WARNING:

Don't look for the oldest Hanna cylinder on your maintenance records, or among purchase orders or requisitions for replacement parts. This Hanna cylinder might be buried or almost forgotten, simply because it has done its job so well for so long that it is taken for granted. Even parts that are normally replaced, like piston and rod packings, may not show up on your records because of Hanna's pioneering in the use of rod packings that compensate for wear and "sealed for life" automotive type piston rings.

FINGERPRINTS

Every Hanna cylinder built has been fingerprinted—its serial number has been entered on a permanent Hanna record. Its age, dimensions, mounting and construction details are on file. That's why replacement parts, if ever required, can be furnished exactly as needed. No slip-ups or costly delays when ordering parts for a Hanna cylinder.

REWARD:



If you have an old Hanna cylinder in your shop, fill in the coupon and mail it to Hanna Engineering Works. We will send you an official entry blank which qualifies you for one of three, one hundred dollar prizes for the person identifying the first, second or third oldest Hanna cylinder. The companies in which the three oldest Hanna cylinders are found will receive, for their next cylinder requirement, one new standard Hanna Powrmation or Powrdraulic air or hydraulic cylinder of any size up to eight inch bore. Mounting and stroke may be selected from the Hanna catalog.

Contest closes November 30, 1961. All entries must be postmarked before midnight of that date. Contest open to residents of United States of America only.

I think we have one of the oldest Hanna cylinders. Please send me the official entry blank.

Name_____ Dept._____

Employed by_____

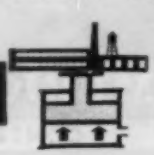
Address_____

City_____ State_____ Phone_____

MAIL TO:
Hanna Engineering Works, 1744 Elston Ave., Chicago 22, Ill.

HANNA ENGINEERING WORKS

1744 ELSTON AVE. • CHICAGO 22, ILL.



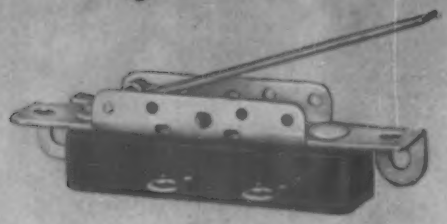
HANNA'S 60th YEAR

RAISING PRODUCTIVITY WITH FLUID POWER

BASIC for Purchasing Agents

Purchasing agents searching for a single source for a wide variety of products are sure to find the value of these American-Standard Controls Division products. This is true of anyone who must control or indicate the pressure or temperature of gases and fluids or electrical energy.

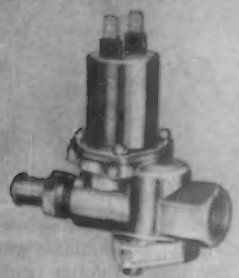
TyniSwitch



Here is a precision miniature snap switch available with a wide variety of actuators which will shave space, yet perform dependably hundreds of thousands of times. It makes and breaks positively *without bounce!* Ratings up to 15 amperes.

AMERICAN-Standard
CONTROLS DIVISION

Solenoid Valves

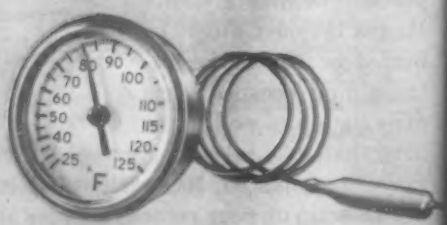


Widely used in the appliance and vending machine industry, these valves have the ability to provide a predetermined liquid flow without regard to pressure. Brass, stainless steel or nylon bodies. Wide selection of mounting brackets, line connections and electrical specifications.

AMERICAN-Standard
CONTROLS DIVISION

You can get detailed information on any of these products by writing American-Standard Controls Division, 5900 Trumbull, Detroit 8, Michigan.

Remote Reading Thermometers



There are practically no limits as to the specialized applications for Rochester thermometers. This remote reading thermometer is hermetically sealed, is available in a wide variety of ranges and capillary tube lengths.

AMERICAN-Standard
CONTROLS DIVISION

AMERICAN-Standard
CONTROLS DIVISION

D. T. Williams Valves

D. T. Williams value valves are bronze for superior corrosion resistance. For many years they have been called "Guardians of the Pipelines"; available in gate, globe, hose, angle, check and quick-opening models, with a variety of seat types and materials.

AMERICAN-Standard
CONTROLS DIVISION

Pressure Gauges

Rochester pressure gauges have a multi-wound helical coil and are unmatched for extensive cycling and continued accuracy under extreme conditions. Friction and hysteresis is below readable limits. Available in 2", 3" and 5" dials. Ranges to 10,000 psi.

AMERICAN-Standard
CONTROLS DIVISION

Industrial Thermometers

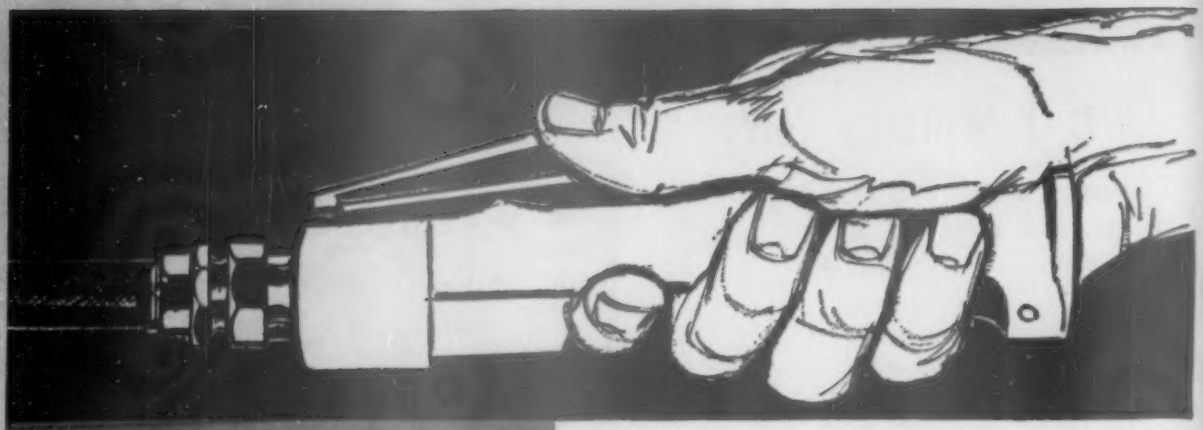
Rochester bimetal industrial dial thermometers provide extreme accuracy, are hermetically sealed and can be externally calibrated. Available in standard dial sizes from 1" to 5", and with scale ranges from minus 150°F to 1000°F.

AMERICAN-Standard
CONTROLS DIVISION

Pressure, Temperature Controls

ASCD makes a wide variety of heavy duty controls for either pressure or temperature applications. They are extraordinarily rugged, can be designed to meet almost any condition.

AMERICAN-Standard
CONTROLS DIVISION



ONE-HAND COMMAND

. . . of any lifting situation to 4000 pounds. Lightweight, easy-to-use Gardner-Denver air hoists do all the work—operator simply presses a lever to lift or lower at the speed he selects. Both piston and rotary types available from our complete line. Write for Section 86 bulletins.

GARDNER-DENVER AIR HOISTS:

- Can't spark
- Can't be damaged by overload stalls
- Can't burn out
- Protected from dirt, dust, moisture, corrosive fumes
- Maximum safety—powerful mechanical brake

GARDNER-DENVER Since 1859

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

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For more facts Circle 433 on Reader Service Card

urethane coatings pass chemical resistance test with *flying colors*

Performance-proven in such corrosive atmospheres as chemical plants, acid tank haulers and marine environments, urethane coatings are now the standard protective finish for the Grumman "Ag-Cat", a custom-designed crop dusting plane.

Before using urethane coatings, engineers found that potent agricultural chemicals were almost as harmful to aircraft finishes as to bugs. Hot and cold temperatures contributed to other paint problems. But urethane coatings on the Ag-Cats impart excellent resistance to chemicals and weather.

Reason: A crosslinking chemical reaction of isocyanate molecules forms a hard but resilient armor that locks out corrosion, oil and solvents, abrasion and wear; locks in long coating life—even under some of the most corrosive conditions imaginable.

For the inside facts on other urethane coating success stories and the nearest source of supply, write:

MOBAY CHEMICAL COMPANY

Code FA-7 Pittsburgh 5, Pa.

MOBAY

C-6

AIM BRAND SLOTTED ANG
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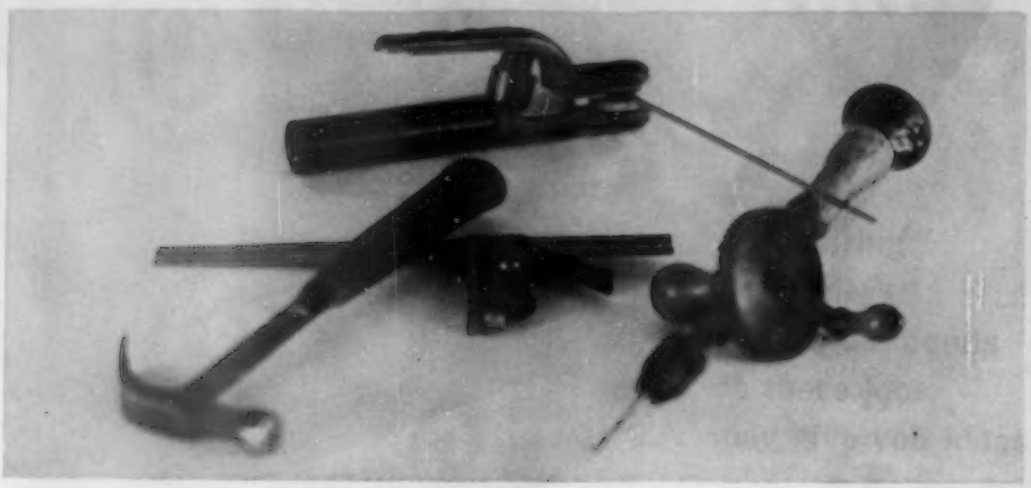


UNCOMPLICATES YOUR CONSTRUCTION

Shear it to size, grab a wrench—and *go*. That's how easily structures take shape with Acme Steel's AIM Brand Slotted Angle. Storage racks, mezzanines, platforms, stairways, tables and carts, literally any type and size equipment, can be bolted together in record time—without a king's ransom in tools and talent. Slotted angle, an AIM Brand Cutter, a wrench, nuts and bolts are the only materials needed.

There's no figuring and finagling to fit pieces. Slots and holes, in a precise recurring pattern, line up with flawless accuracy. You needn't tie-up skilled personnel. Regular labor can master this complication-free assembly in minutes. And steel or aluminum AIM Brand Slotted Angle carries its load for keeps. The perfect-fit connections won't budge, buckle, wrack or crack.

An Acme Steel Exclusive—Ready-to-Assemble Kits

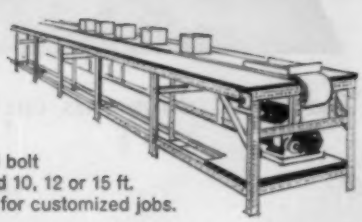
As an added convenience, over 200 popular types and sizes of structures are now available pre-cut, ready-to-assemble. Your local AIM Brand distributor has all the facts and figures. Or, send for your free copy of the new fully illustrated idea booklet, "Creative Framing at Lowest Cost." Write: Acme Steel Company, Dept. FACP-101, 135th St. & Perry Ave., Chicago 27.

ACME STEEL

IDEA LEADER IN

FRAMING · STRAPPING · STITCHING

Slotted Angle Kits offer new convenience and economy in pre-cut form.

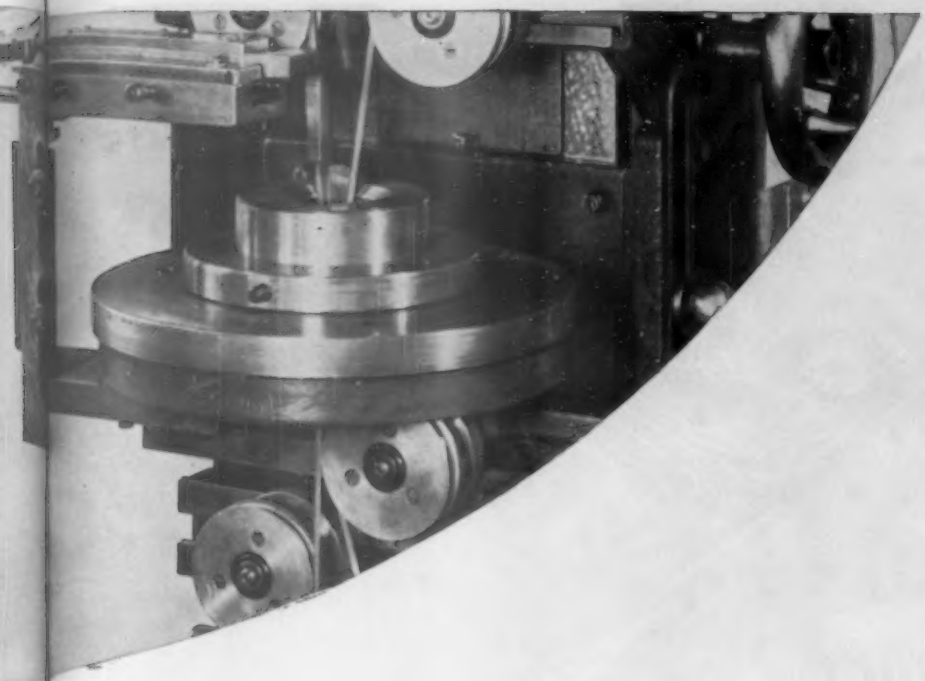


Cut and bolt standard 10, 12 or 15 ft. lengths for customized jobs.

Grinding Ceramic Wafers *(below) for nuvistor tubes. Two diamond wheels finish 2000 wafers per hour for Electron Tube Division of RCA. Wheels remove 0.003" stock from each surface simultaneously. Previous method using abrasive belts ground only one surface at a time, resulting in nonuniform results and stoppages. Expected life of wheels: 5,000,000 wafers.*

Servicing High-Speed Carbide Dies *(above). Jacoby Bender Inc. makes expansion watch bands. Their dies are for precious and semiprecious metals, as well as stainless steel. Finished products must have flawless finish. Small diamond quills from size .020" to ¼" diameter are used to build and service carbide dies. Grinders also cut decorative relief in some dies.*

Industrial diamonds cut practically everything . . . especially your production costs



Polishing Drawing Dies *(above) for Chase Brass & Copper. Die-polishing job that once required 2 to 6 hours' handwork is now finished in 15 minutes with diamond belt polisher. Accuracies and surface finishes are also greatly improved. Belts are impregnated with 100, 200 or 300 mesh natural diamond grit. Up to 200 dies have been serviced by a single belt.*

Putting Mirror Finish *(below) on hardened steel part for a forming die at Jacoby Bender. The natural diamond micron powder is applied with a wooden lap. The diamond paste speeds up the polishing operation, and has less tendency to distort the true form of the tool-steel than methods previously used.*

Considering how well natural diamonds do these jobs may give you ideas

The four grinding and polishing jobs shown here span the fields of electronics, jewelry making, and metalworking. But they have one thing in common: in every case, natural industrial diamonds are doing the job quickly, economically and well.

In diamonds, you find this unique combination of properties: excellent cutting ability coupled with fantastic endurance.

Result: your diamond tools last longer than any other tools you can use. Your people spend more time producing, less time changing tools.

If you cut, sharpen or smooth in your business, you quite probably can use natural diamonds to advantage. Test them against the method you're now using. You will see how efficient — and economical—a diamond can be, especially now.

Best grit for metal-bond wheels developed by the Diamond Research Laboratory in Johannesburg

A new impact crushing method for natural diamonds is now producing the strongest and most durable diamond grit ever obtained for metal-bond wheels. Your tool and wheel manufacturer is ready to help you select the diamond tool that's right for *your* job.

Industrial Distributors (Sales), Ltd.

with
Square D
Lay-in Duct
you can---

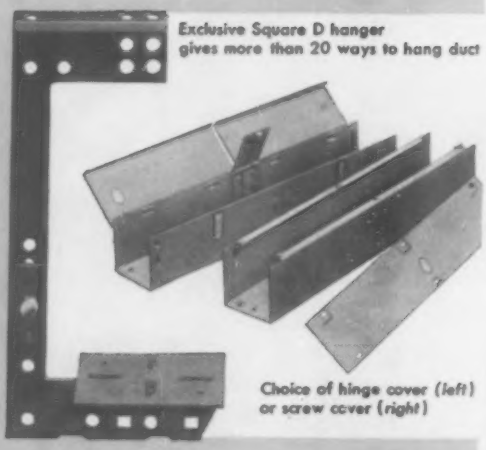
INSTALL WIREWAYS FASTER AND AT MUCH LESS COST!

Before you decide to install conduit on a job, check to see if you shouldn't be using *Lay-in Duct* instead. Experience shows that in 1 out of 7 cases, the job can be done faster and at substantially less cost with *Lay-in Duct*.

Not only that, but *Lay-in Duct* makes it easy to add extra circuits later on, makes machinery circuits readily accessible, makes it simple to modify layouts. *Lay-in Duct* is completely reusable, requires less labor on multiple circuits.

You get extra advantages when you use SQUARE D *Lay-in Duct*. You can choose from two types—hinged cover or screw cover—and from the most complete line of fittings available. All fittings can be used with either type. You get the fastest installation—quick couplings. The exclusive Square D hanger gives exceptional flexibility—provides more than 20 ways to hang Square D wireways. You get real rigidity, too—joint design triples duct strength. Available in four sizes—2½, 4, 6 and 8 inches.

Write for Lay-in Duct literature. Address Square D Company, 1601 Mercer Road, Lexington, Kentucky



Exclusive Square D hanger gives more than 20 ways to hang duct

Choice of hinge cover (left) or screw cover (right)

SQUARE D COMPANY

wherever electricity is distributed and controlled

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FOOD FOR THOUGHT

ANTIQUE ?

just about, thanks to Automatic Canteen

Time was when most workers carried a lunch box.

No more—not with Canteen food service on the job.

Now they can get a complete—and completely automatic — food service right where they work. Hot meals, hot and cold beverages, salads, sandwiches, pastry—even soups —any hour of the day or night, at the drop of a coin. In factories and offices, in schools and colleges, in hospitals, institutions, governmental agencies.

A major reason for the increasing popularity of Canteen food service is the high quality of the food served. And this, in turn, is due to many factors:

Modern test kitchen; master chefs and graduate dieticians; spotless commissaries; high standards in the selection and preparation of foods; most important, *the desire to serve the best food at the lowest possible price to the most people.*

How can *you* enjoy delicious Canteen food? Easiest way we know is to go to work in an office or plant that enjoys Canteen service . . . or have Canteen service installed where you work.

NOTE TO EMPLOYERS: Antique in-plant feeding methods can be costly in time as well as money. Canteen offers you a completely modern, completely integrated food service—manual, automated, or a combination of the two. For further information, call your local Canteen representative. You'll find his name listed in the Yellow Pages. Or use the convenient coupon.

CANTEEN MACHINES serve complete hot meals or delicious snacks 24 hours a day.

AUTOMATIC CANTEEN

AUTOMATIC CANTEEN COMPANY OF AMERICA

Food Service Division
AUTOMATIC CANTEEN COMPANY OF AMERICA
Merchandise Mart Plaza
Chicago 54, Illinois

Gentlemen: I'm interested in knowing what Canteen automated food service can do for us. Please send complete information.

Name_____

Address_____

City_____ Zone____ State_____

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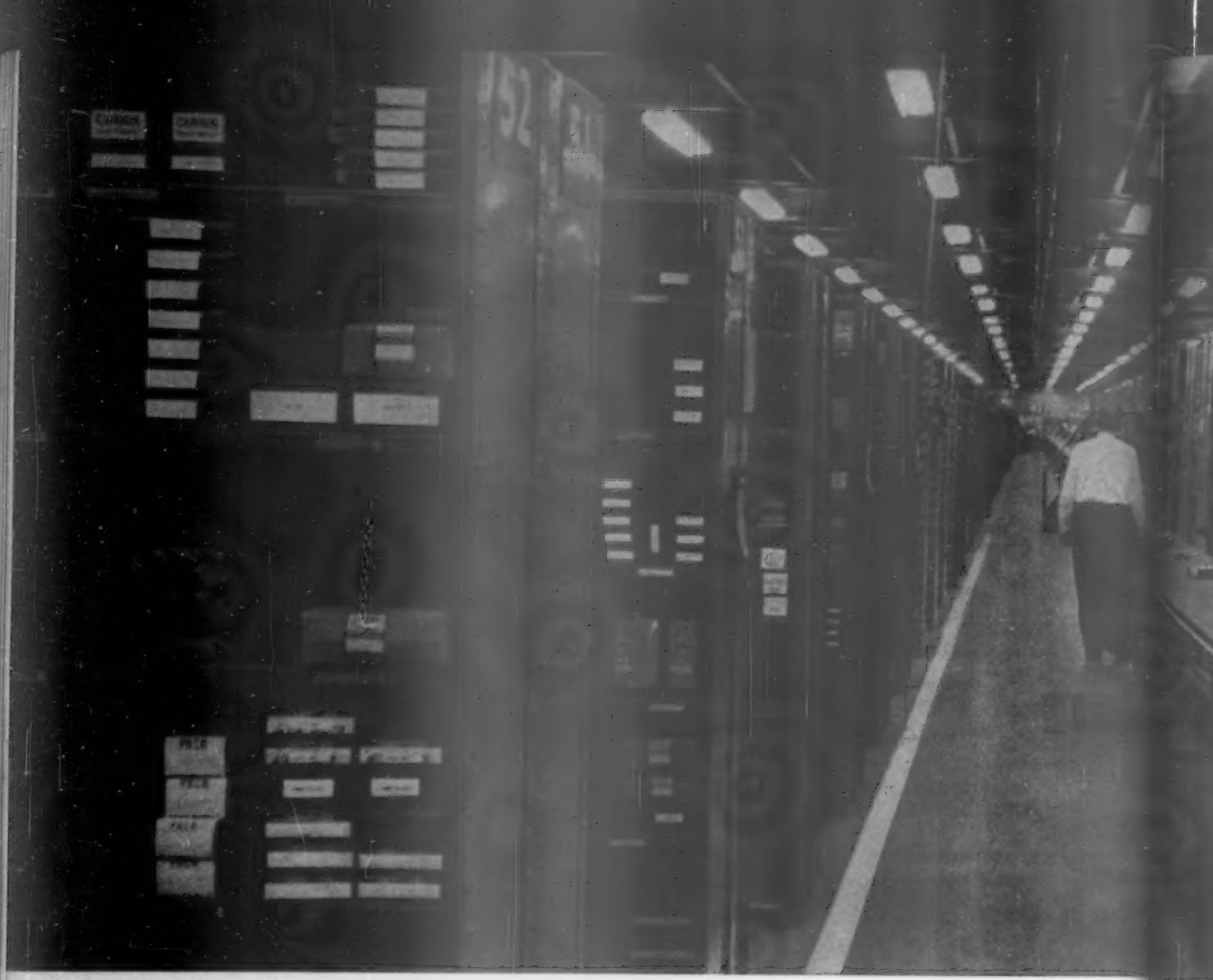


Inventory Management Simulator program at...

Clark Equipment... improves customer se

■ High-capacity memory. Two IBM 305 Data Processing Systems with RAMAC keep track of 75,000 replacement and repair parts in Clark's Chicago parts warehouse. **■ The computer has the facts.** As soon as shipments arrive at the warehouse, an operator, using this remote inquiry station near the loading platform, finds out from the computers where various items go. **■ Customer service first.** Using this remote inquiry station in the sales department, the operator gets information from the computer while the customer is on the phone.

Clark Equipment Company has prepared a computer program called an Inventory Management Simulator. The program allows Clark management to study the possible effects of decisions on future customer service and future warehouse profitability. When management gets the computer's report, it is in a position to make new rules for the operation of its parts warehouse.

Here's what's happened since Clark put the new program into operation:...improved customer service...practically eliminated back-order problem . . . reduced the putaway time for incoming material by more than 50 per cent . . . reduced emergency order shipping time by 50 per cent... enabled a physical inventory to be taken without any interruption of service to customers.

service...with less inventory

Availability highest ever. Inventory management is a complex job at Clark. Its Chicago warehouse is one of the busiest and largest in the country. Before the Simulator program was developed, the warehouse carried an inventory of 85,000 individual replacement and repair parts. Use of the program helped transfer the investment in inventory to those parts most frequently called for, giving high availability with less investment.

Management Operating System.* Clark installed two IBM 305 Data Processing Systems with RAMAC.® These computers store, update, and offer on an instant's notice information on almost every aspect of the warehouse operation including complete information on every one of the 75,000 items maintained in stock.

Now, Clark is assured of maintaining just the right level of stock for each item. The procurement formulas, developed from the Inventory Management Simulator, even recommend how large a purchase order should be placed for each item and where it should be placed.

If you have an inventory problem, why not consider a simulation program? You don't have to have your own computer. We can supply you with an Inventory Management Simulator...you can rent time on a computer. Result...improve the profitability of your warehouse operation.

**A Management Operating System uses IBM computers to make routine business decisions and take action automatically ...flags problems that need management's special attention... frees management to concentrate on the big problems and on long range planning. As a result, it gives tighter control of all business operations...and helps cut costs.*

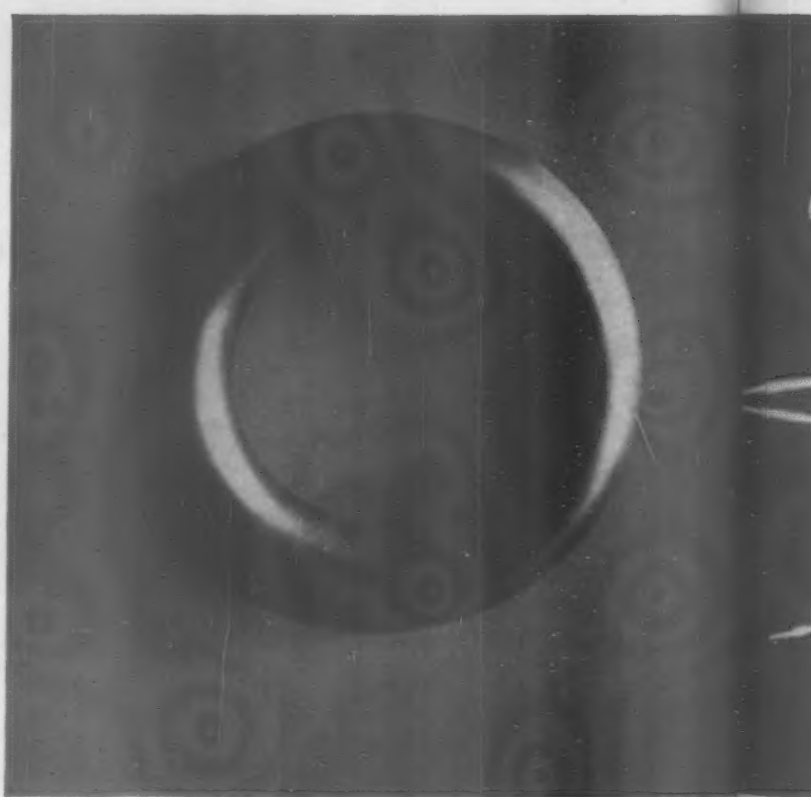
IBM®
DATA PROCESSING

For more facts Circle 439 on Reader Service Card

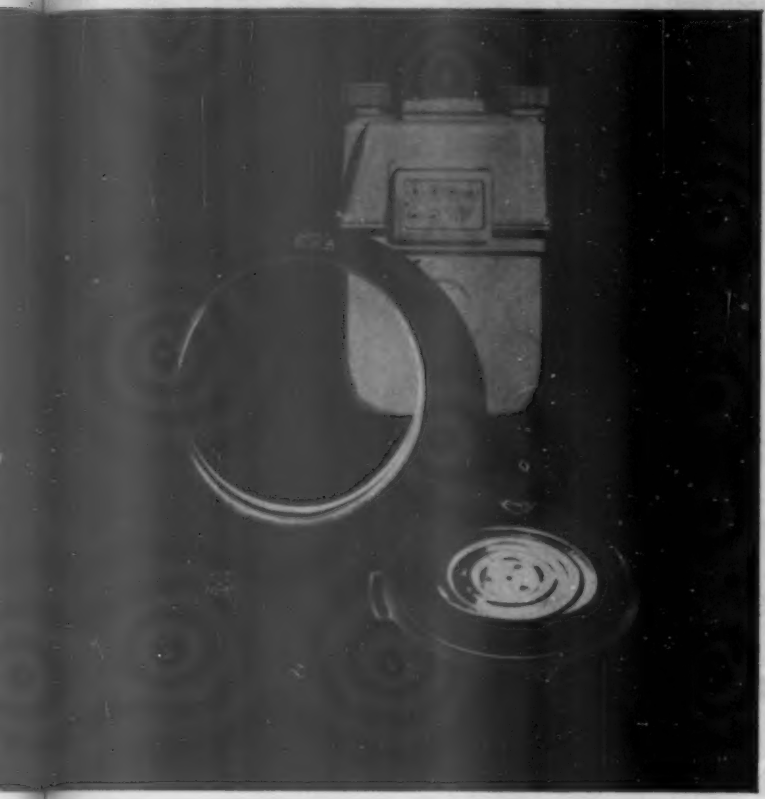
WHY POLYSULFIDE CRUDES A

HIGH SOLVENT RESISTANCE. Industry has found no other elastomers perform so well so long under exposure to oils, aromatic fuels, chemicals, solvents and other degrading liquids as THIOKOL polysulfide crudes. Top name manufacturers of paint spray equipment, for example, have made polysulfide rubber the traditional choice for lining hose. As a carrier of paint, solvent, thinners, THIOKOL polysulfide rubber provides trouble-free service years on end.

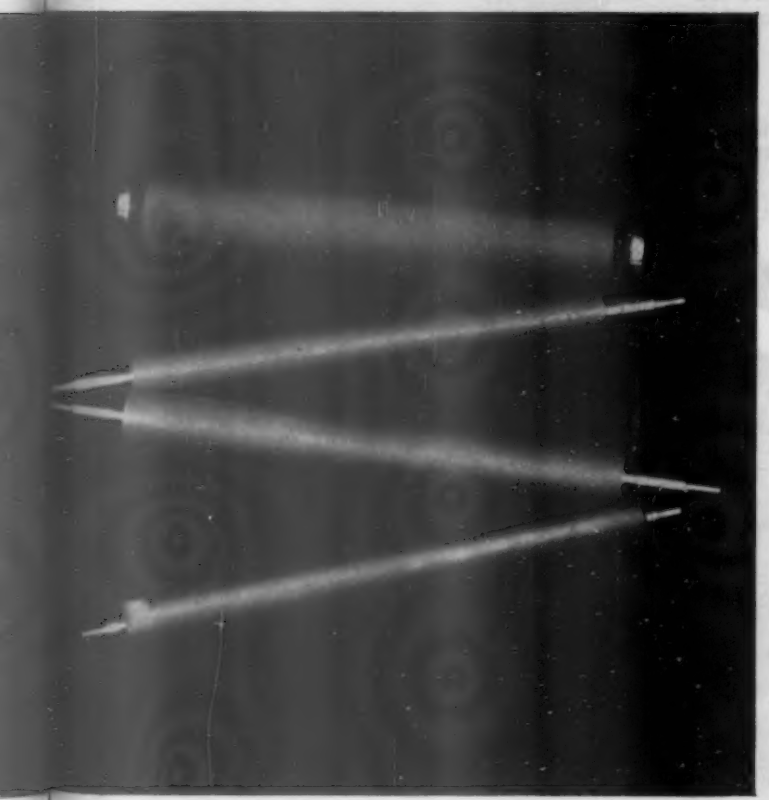
LOW TEMPERATURE FLEXIBILITY. Though the mercury drops far below zero, polysulfide crudes stand up—without plasticizers. No brittleness. No cracking. No loss of serviceability. In demanding applications such as gaskets and O-rings in aircraft fuel systems, THIOKOL polysulfide rubber keeps its resiliency through the low temperatures of high altitudes. Rubber components, hose, sheeting can be fabricated for service at temperatures to minus 65 deg. F.



ARE PICKED FOR THE BIG JOB



IMPERMEABILITY TO GASES. From sheets of polysulfide rubber or fabrics coated with it, manufacturers of gas meter and regulator diaphragms are producing the most reliable measuring components ever. THIOKOL polysulfide crudes maintain full integrity though constantly exposed to degrading gases, sunlight, ozone, vapors and to wear of diaphragmatic action.



LONG LIFE. Widening use on printing and coating rollers constantly subjected to solvents, thinners and physical stress underscores ability of THIOKOL polysulfide crudes to deliver long service life under severe conditions.

Thiokol offers comprehensive technical literature detailing properties and performance characteristics of polysulfide crudes. Copies of this helpful material will be mailed to you on request. Write on your letterhead, or use handy coupon.

Thiokol®
CHEMICAL CORPORATION

THIOKOL CHEMICAL CORPORATION
780 N. Clinton Ave., Trenton 7, N.J.
In Canada: Naugatuck Chemicals Division, Dominion Rubber Company, Elmira, Ontario

Gentlemen: Please send further information about following properties of polysulfide crudes: ☐ High solvent resistance ☐ Impermeability to gases ☐ Low temperature flexibility

Name_____
Firm_____
Address_____
City_____ State_____

WHY

do more than 4,000 plants use *American*

adjustable STORAGE RACKS

?

Stronger Construction

Specially roll-formed Posts are extra heavy gage steel . . . sturdy Stringers are one-piece continuous welded steel tubing . . . Upright Frames are cross-braced against sway . . . Turnbuckles "level out" uneven floors.

Quicker Assembly

No special tools required . . . no welding or costly bolting . . . all parts scientifically engineered to hook easily and securely into place.

Easier Adjustability

Stringers work independently of any other part . . . they raise and lower like a window, on 4" centers . . . make rigid connection when "locked" to post.

Greater Efficiency

American Racks use every inch of storage space . . . they save you time, labor and money from the very start of installation . . . provide industry's highest safety factor for utmost protection.

There's an American Storage Rack for every storage need

Send for Catalog!

A typical American Storage Rack installation

AMERICAN METAL PRODUCTS COMPANY
STORAGE RACK DIVISION
5965 Linsdale Ave. amp® Detroit 4, Michigan

Manufactured in Canada by Sunshine-Waterloo Co., Ltd., Waterloo, Ontario

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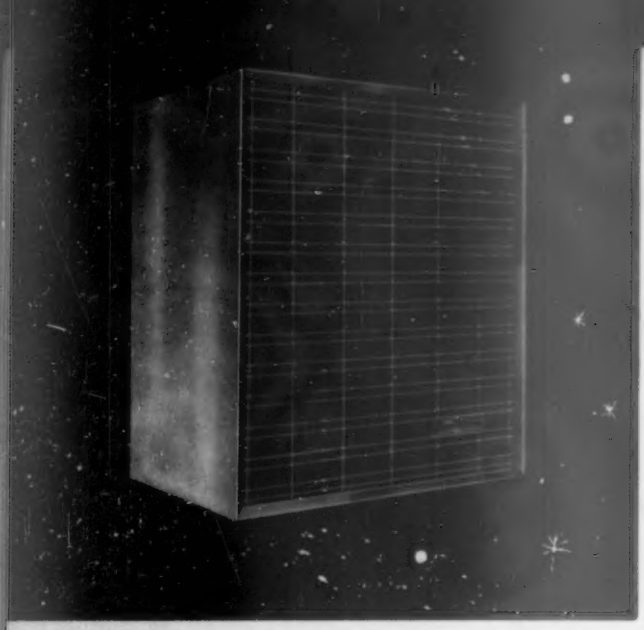
JANITROL

presents a dramatically new achievement

67 SERIES

GAS-FIRED UNIT HEATERS

UNPRECEDENTED STYLING, PERFORMANCE AND DURABILITY TO MEET THE MODERN TREND IN ARCHITECTURAL DESIGN



provide the ultimate in quality and economy

new JANITROL GAS-FIRED

commercial & industrial heating equipment

ALL NEW! JANITROL 67 SERIES UNIT HEATERS FEATURING. . . STELLAR NEW STYLING, PERFORMANCE AND DURABILITY!

New Janitrol 67 Series Unit Heaters are unusually handsome . . . incredibly quiet and efficient. They bring you, for the first time in unit heater history, distinctive appearance you can recommend for the smartest business setting. And they offer in even greater measure the traditional Janitrol quality and dependability in heating.

Their clean, crisp "look" is a departure from the crude, cumbersome industrial appearance of yesterday. Modern machine tools, trucks and structures have evolved as attractive, functional designs. And now, Janitrol sets the pace in unit heater styling!

The draft hood opening and adjustable louvers are concealed by the beautifully styled gold-tone grille. The rear combustion air inlet permits use of a solid bottom panel . . . eliminates any possibility of obstruction to combustion air intake.

Inside, design progress is equally significant. Yet every part is proven . . . every safety feature is included. Result? Performance no other unit heater can duplicate.

Naturally, the "heating heart" of every new Janitrol is the famous Janitrol Multi-Thermex heat exchanger with this unchallenged record for durability and low maintenance: among nearly three million heat exchanger tubes produced since 1940, replacements for all causes have run less than ¼ of 1%.

Investigate the many exclusive advantages of Janitrol 67 Series Unit Heaters for jobs you specify or install. Let them help build your reputation for quality.

FEATURES THAT MAKE ALL OTHER UNIT HEATERS OLD-FASHIONED!

New "sheer look" styling—Beautiful Phoenix Beige finish • New gold-tone grille. Conceals louvers and draft hood opening • Low overall height • Automatic controls—Fully accessible • Factory-fired • Low Voltage Gas Controls—Standard • Low Voltage Sensitive Thermostat—Standard • Limit control—interrupts control circuits and shuts off fuel if unit temperature becomes excessive • Thermopilot Shut-off. Shuts off all gas, including pilot, in event of pilot flame failure • Automatic Pilot. Exclusive Janitrol low Btu. non-linting design • Quiet air delivery. Acceptable for schools and other applications where conventional units are too noisy • Motor prelubricated for 5 years • Built-in Draft Hood. Removable, provides full access to heat exchanger. Protects burners from abnormal up or down draft • Combustion air inlet. At bottom rear, through control enclosure. Controls constantly cooled by combustion air stream. Eliminates cross draft on burners • Ampli-Fire Ribbon Flame Burners. No flame contact on metal. Removable, with non-linting air shutters featuring thumb-screw adjustment. Eleven models from 30,000 to 250,000 Btu/hr.

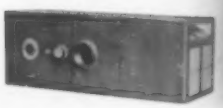
MEET EVERY COMMERCIAL AND INDUSTRIAL HEATING NEED FROM JANITROL'S BROAD LINE

GAS-FIRED DUCT-FURNACES
Install in a duct where air is circulated by separate blower. Adaptable for use with cooling. Two sizes: 200,000 and 300,000 Btu/hr. input—may be combined to provide capacity from 200,000 Btu/hr. up, in increments of 100,000 Btu/hr. input. Six sizes, from 50,000 to 225,000 Btu/hr. in Duct 55 models.

BLOWER-TYPE UNIT HEATER
Allows air delivery from greater heights and against greater static pressures. Models with exposed or enclosed blowers. A.G.A. approved as low and high static-type blower unit heater for air delivery to duct system up to 1.0 in. W.C. external static. Heat sections factory assembled. Sizes: 300,000, 400,000 and 500,000 Btu/hr. input.

FLOOR-TYPE UNIT HEATER
Cold air drawn from floor level is heated, filtered and discharged horizontally overhead. Quiet, clean, carefree—ideal for offices, restaurants, stores, labs, etc., requiring a compact unit.

HEAVY DUTY BLOWER HEATERS
For unit heating, central heating and air conditioning. Wide range of standard blowers and motors assures correct air delivery and temperature rise in each application. Factory assembled and tested. Capacities from 250,000 Btu to 1,750,000 Btu/hr. input.



HORIZONTAL OIL UNIT HEATER
For suspension overhead. Saves floor space. Compact, efficient, low-maintenance design clean and quiet in operation. May also be used to feed duct system. Choice of sizes from 84,000 to 250,000 Btu/hr. output to meet all needs.

helpful data for
ARCHITECTS, CONTRACTORS AND ENGINEERS
write today for complete information on Janitrol units for heating with clean, economical gas in buildings of every type. There's no obligation.

JANITROL
HEATING AND AIR CONDITIONING
A Division of Midland-Ross Corporation
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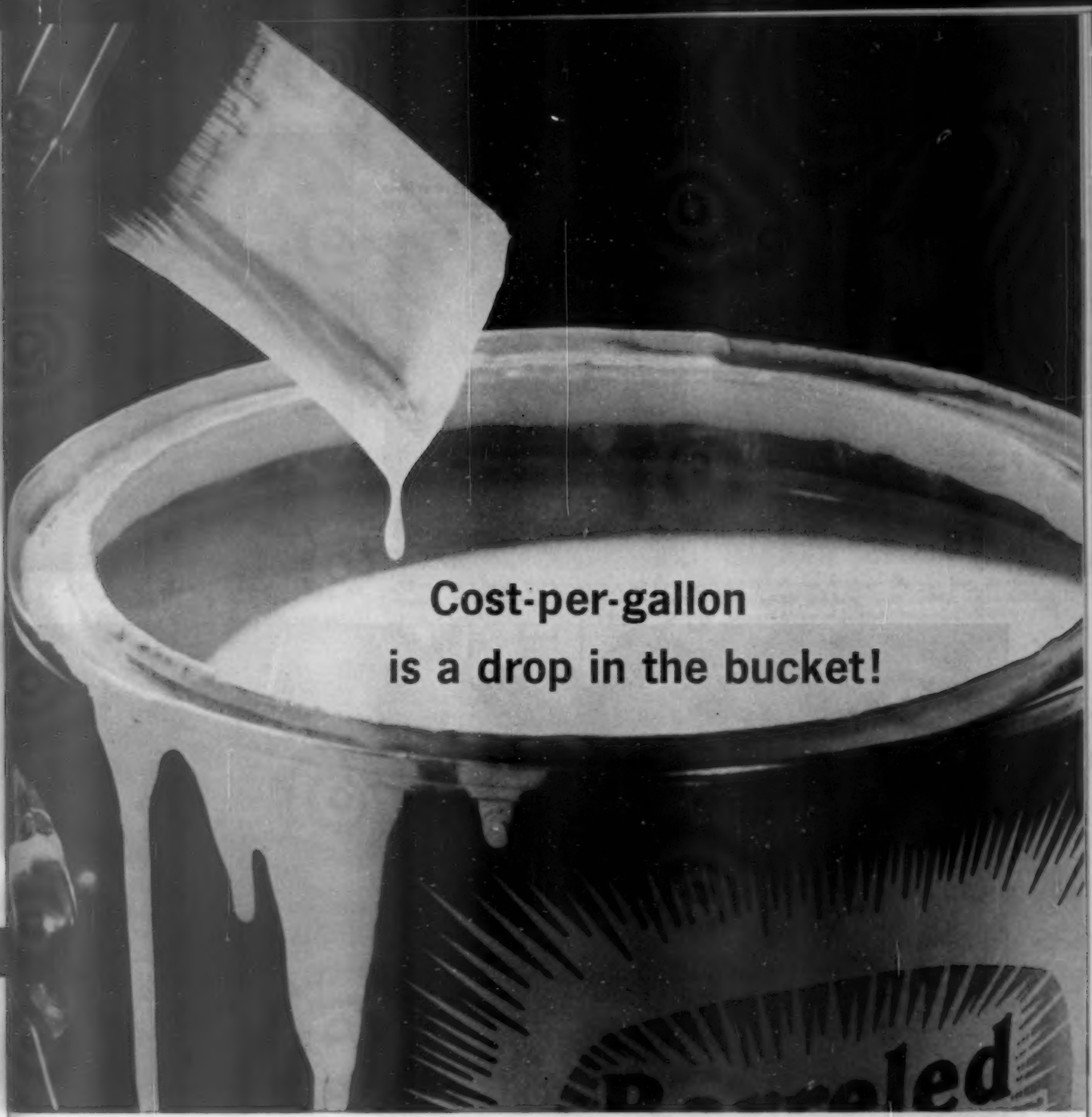

(The **big** savings in **Barreled Sunlight Paints** are in their lower "on-the-wall" costs.)

What you pay for paint "in the can" is a small part of your total tab for paint maintenance. It's what you pay for the applied cost per square yard—the "on-the-wall" cost—that really adds up to a debit or credit on your paint purchase order. ↓ ↓ This is why an increasing number of plant engineers and maintenance men are asking for Barreled Sunlight Engineered Paints by name. Their experience has proved that Barreled Sunlight Paints not only cost less to apply (because they go on faster, easier, with fewer costs) but actually last longer under tough conditions. ↓ ↓ Before you buy *any* paint—at any price!—have a Barreled Sunlight Engineered Paint representative prove the economy of quality with an actual "On-The-Wall" Demonstration in your plant. No charge . . . no obligation. Write Barreled Sunlight Paint Company, 124-J Georgia Avenue, Providence 5, Rhode Island

2 FREE GUIDES

The famed Barreled Sunlight "Quick Reference Guide" to more than 50 Engineered Paints, Primers and Undercoats plus a 10-page booklet on "How To Reduce Painting Costs." Write for them.

Barreled Sunlight

ENGINEERED Paints

For a Better Looking, Longer Lasting Paint Job at Lower Cost

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NEW "DIAL TORK" Nutrunner. The only power tool you can "dial in" for the precise torque you want. Ideal for the type of assembly or service work where a variety of fasteners must be tightened to different torque settings—with hand torque accuracy.

"One-Shot" Air Screwdrivers with offset or lever handles; reversible or non-reversible; silent exhausts. Torque range: 7 to 100 in.-lbs.

✻ The secret of CP "One-Shot" Fastener Driving Tools lies in the precise torque sensing ability of the tools themselves. Put the tool on the work—press the throttle—the instant precise torque is attained *all* driving action stops. Its torque-awareness is unequalled by *any* clutch for *accuracy* and *consistency*. So don't just specify "torque control"... be sure you specify CP "One-Shot."

CP "One-Shot" Screwdrivers can save up to 75% in fastener driving time... eliminate stripped threads.

Chicago Pneumatic

PNEUMATIC TOOLS • ELECTRIC TOOLS • AIR COMPRESSORS • DIESEL ENGINES • HYDRAULIC TOOLS • AVIATION ACCESSORIES

"One-Shot" Electric Screwdrivers with lever or offset handles. Torque range: 7 to 100 in.-lbs.

"One-Shot" Angle Nutrunners are jolt-free... easy to hold! Fasteners installed accurately to torque specifications. Range: ½ to 200 ft.-lbs.

CP-200 Torque Analyzer provides fast, simple method for checking clutch settings and stall torques of portable tools. Maximum capacity 200 in.-lbs.

If your responsibility is threaded fastener driving... DON'T JUST SPECIFY "TORQUE CONTROL" ...SPECIFY CP "ONE-SHOT"* FOR THE ULTIMATE IN TORQUE ACCURACY, CONSISTENCY!

Since the first CP "One-Shot" torque control power screwdriver was introduced in 1954, industry has come to realize the *real plus values* of the consistent accuracy these tools maintain. They have proved their money-saving advantages because:

1. They cut spoilage and rejects to a minimum.
2. "One-shot" principle reduces clutch wear to the minimum... torque settings remain constant indefinitely... but are readily adjustable over a wide range when job specifications demand it.
3. They make training of operators easier and faster... simplify changes in work assignments.

CP manufactures the most extensive line of "one-shot" tools available today. Let a CP Torque Control Specialist help you solve your fastener driving problems. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N.Y.*

"One-Shot" Nutrunners hold their settings... simplify training of operators.

For more facts Circle 444 on Reader Service Card

SCIENTIFIC PACKAGE SMASHING PROVES AVISTRAP CAN MATCH STEEL STRAPPING

Container Laboratories, Inc., New York, recognized expert in package research, reports Avistrap® Cord Strapping can match or better the performance of steel strapping in comparable applications. Behind this statement is a carefully-observed series of independent tests, comparing performance of Avistrap in ⅜ in. and ⅝ in. widths with performance of .015 steel strapping in the same widths, in package reinforcement, bundling, and palletizing. A comparison in terms of tensile strength, elongation, and energy required to break was also made. This showed Avistrap's amazing ability to keep on absorbing energy without breaking, long after comparable steel strapping has failed. Container Laboratories, Inc. designed the tests to duplicate actual shipping situations. Packages were dropped on corners and edges, subjected to an incline impact test, and vibrated for hours with a force equal to their own weight. The test program was carried out without any guidance or instructions from American Viscose Corporation.

A summary of test results, as approved by Container Laboratories, Inc., is available on request. Write to Dept. K. Ask for "Evaluation Booklet."

AVISTRAP® CORD STRAPPING

AVISTRAP® CORD STRAPPING*

*Patents pending.

AMERICAN VISCOSE CORPORATION, INDUSTRIAL PACKAGING DEPT. K, 1617 PENNSYLVANIA BLVD., PHILA. 3, PA.

District Offices: Atlanta, Ga. • Boston, Mass. • Charlotte, N. C. • Chicago, Ill. • Columbus, Ohio • Dallas, Tex. • Los Angeles, Calif. • New Orleans, La. • New York, N. Y.

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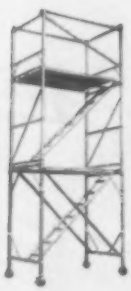
6 MONTH PAINTING JOB CUT TO 4 MONTHS

Up-Right aluminum scaffold-on-wheels gets men up in the air fast...lets them finish the job fast! Lightweight and quickly assembled without tools or loose parts, Up-Right scaffolds are adjustable to provide a safe, convenient working platform at any desired height. In 3 basic types for overhead installation and maintenance.

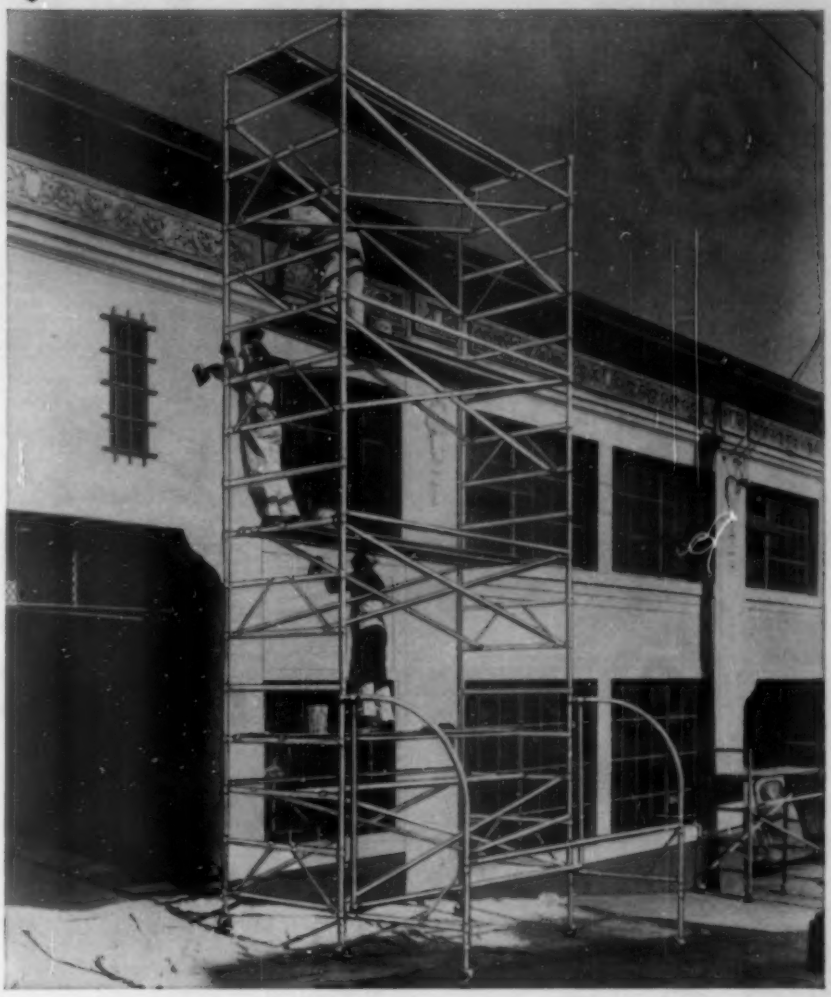


STAIRWAY TYPE

SPAN TYPE

TALLESCOPE

HERE'S HOW INDUSTRY SAVES ON OVERHEAD MAINTENANCE WITH NEW ALUMINUM SCAFFOLD



5,000,000 square feet of building exteriors at Texas plant were painted from Up-Right rolling aluminum scaffolding at one-third savings in cost and time compared with conventional fixed scaffolding. The 2-story exteriors were painted progressively in sections—each section worked from a span scaffold measuring 10 feet long and 16 feet high. 5 sets of aluminum scaffolds were used on this 4-month project. Lightweight and rapidly assembled, the scaffolds were rolled with the job without disassembly.

Write for descriptive circulars

UP-RIGHT SCAFFOLDS

DEPT. 178, 1013 PARDEE, BERKELEY, CALIFORNIA

In Canada: Up-Right Scaffolds, Ltd., 120 Russet Ave., Oshawa, Ontario

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LINK-BELT conveyors

The last word in value from the first name in conveyors

CHAIN CONVEYORS—Carry the load directly on chain or drag bulk materials along a trough. Link-Belt builds a variety of chain conveyors with single or multiple strands . . . for light to extremely heavy-duty applications . . . for routes a few feet to hundreds of feet long. This conveyor unloads skids of bagged material from trucks, through weighing and to storage.

When it comes to your materials handling needs, it is a matter of sound economics to depend on Link-Belt, builders of industry's most complete conveyor line. In addition to this broad range of line, which permits unbiased recommendations, Link-Belt offers *quality*—achieved through engineering skills, manufacturing scope and research . . . *"experience unlimited"* in the materials handling field.

Also important, Link-Belt can provide *complete* handling systems . . . patterned exactly to your requirements with a background of more than 80 years of conveyor specialization. Our engineers are familiar with the particular handling needs of every industry. It's more than likely they have met—and solved—many problems similar to yours. We will design, equip and erect your entire installation . . . and accept full responsibility for its successful operation.

For full information—on single components or complete systems—large or small—contact your nearest Link-Belt office. Catalogs covering all conveyors are available on request.

unlimited

The line that means savings, whether handling parts or bulk materials, finished products or units

SCREW CONVEYORS—Easily adapted to congested locations . . . operate horizontally, vertically or inclined. Link-Belt provides all components for a complete screw conveyor line. Exclusive optional *Quik-Link* feature permits fast, easy removal of any conveyor section without disturbing other components.

BELT CONVEYORS—Link-Belt serves as a single source for design, equipment and erection of *Job-Engineered* belt conveyors for small or large tonnages, for routes of any length. Link-Belt engineers have the selection advantage of industry's most comprehensive idler line—plus a broad range of pulleys, drives, terminal machinery and auxiliary equipment. Husky, *Pre-Bilt* sectional belt conveyors are also available.

TROLLEY CONVEYORS—Link-Belt can provide systems to carry items of all sizes and shapes . . . to travel any path. Handling individual components or finished products, trolley conveyors or power-and-free trolley conveyor systems provide straightline production for operations separated by a few hundred feet or several miles.

TRUKVEYORS—Provide fast, orderly movement of materials on four-wheel platform trucks or dollies. They speed receiving, manufacturing and processing, sorting, storing, shipping . . . reduce physical effort. These versatile units accommodate changes in floor elevation, execute horizontal turns, permit easy disengagement of trucks at any point.

LINK-BELT

CONVEYING AND ELEVATING EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15.634

Keeping production on the move in every industry

Apron conveyors
Arm and tray elevators
Belt conveyors
Bucket elevators
Bucket elevators-conveyors
Bulk-Flo
Car-type conveyors
Chain conveyors
Circular carrier conveyors
Drag conveyors
Flight conveyors
Flite-Flo conveyors
Oscillating conveyors
Power-and-free conveyors
Pusher chain conveyors
Scraper conveyors
Screw conveyors
Sidekar-Karrier conveyors
Skip hoists
Slat conveyors
Trolley conveyors
Trukveyors

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General Electric Makes Eddy-current-coupling Drives

And they're dependable drives. The complete line includes water-cooled and air-cooled eddy-current couplings. We call them KINATROL* drives. Ratings are from 1 to 150 horsepower, operating from standard a-c power.

A General Electric KINATROL drive is not just another eddy-current coupling. For instance, in the water-cooled coupling, water control is packaged. You'll see much less external piping. Furthermore, the coupling is protected from flooding—and the air gaps are dry, preventing corrosion.

KINATROL couplings are compact, field proven and dependable. General Electric has had a good deal of experience in the engineering, manufacturing, and application of packaged adjustable-speed drives. And we know how important service is to a customer.

KINATROL —a good product, with the kind of service you can depend on. Please call your nearest General Electric Sales Office for further details.

*Trademark of General Electric Company

821-07

AIR COOLED, 7-1/2 to 100 HP

WATER COOLED, 25 to 150 HP

AIR COOLED, 1 to 5 HP

DIRECT CURRENT MOTOR AND GENERATOR DEPARTMENT

GENERAL ELECTRIC

ERIE, PENNSYLVANIA

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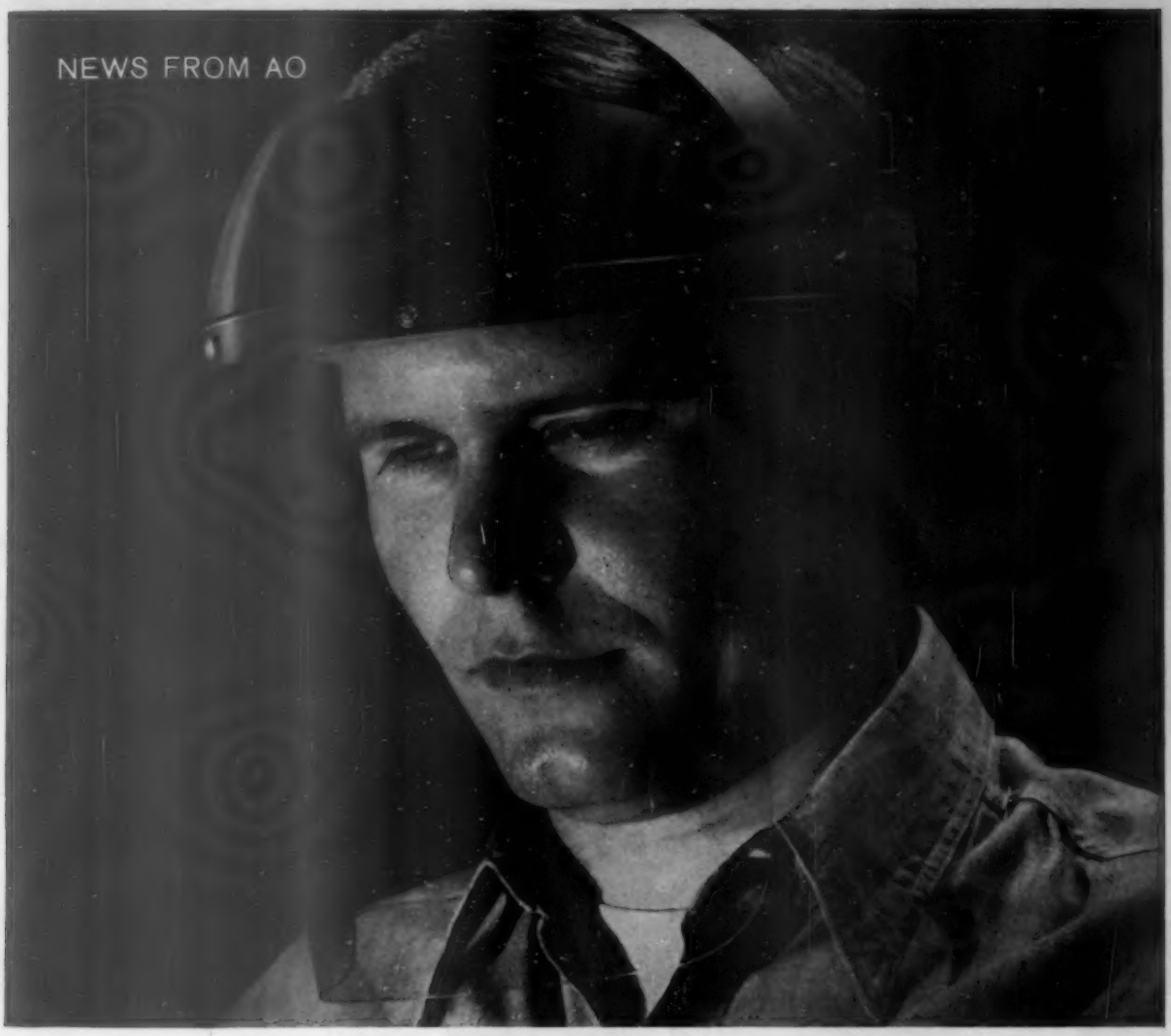

New, Lightweight Face Shield Offers Full Protection

Where full facial protection is required, you'll find the new AO H9 Face Shield is a cool, comfortable answer. Its lightweight plastic headgear weighs only 3¾ oz., can be preset in ⅛ increments from size 6 to 8¼. When set, entire face shield lifts easily on and off.

A deep spark deflector of lacquer-coated, vulcanized fiber keeps particles from entering top of shield, protects forehead. Automatic friction joints require no turning or adjustment. Vinyl foam sweatband provides a cool, comfortable bearing surface resting on the forehead. It absorbs perspiration, preventing it from carrying particles into eyes. Adhesive-backed, it is easy and economical to replace.

This new H9 Headgear accommodates all AO 'H' Series windows—clear or green acetate, aluminized acetate, 24 mesh steel screen, and 283-1 Kool-Vent window. Patented slots permit expansion and contraction, reduce possibility of warping and distortion. For details and prices, call your AO Safety Products Representative or write for folder.

Your Surest Protection . . . AO SURE-GUARD Products

American Optical COMPANY

SAFETY PRODUCTS DIVISION • SOUTHBRIDGE, MASSACHUSETTS

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CUTLER-HAMMER QUALITY 3-STAR MOTOR STARTERS AVAILABLE IN 10 SIZES, 00 THROUGH 8

CUTLER-HAMMER MOTOR STARTERS

Still the proven standard of quality...always in stock for immediate delivery

Millions of satisfactory operations in thousands of applications have proved the unmatched quality of Cutler-Hammer across-the-line magnetic starters. That this line is still recognized as the leader—nine years after the original design was developed—is a great tribute to the years-ahead thinking of Cutler-Hammer engineers.

FIRST IN '53—STILL THE LEADER IN '61

Since the Three Star line was introduced in 1953, many improvements have been made; magnet coils that far exceed NEMA standards, for example. But many achievements of the original design—vertical, dust-free contacts; overload relays adjustable to within 3% of actual full-motor ratings; provision for 2 or 3-coil overload relays in the same enclosure—are features no other manufacturer has been able to improve. You can safely bet that when these pace-setting features are improved, it'll be another Cutler-Hammer development.

ALWAYS AVAILABLE FOR FAST DELIVERY

You'll find the smaller sizes of Cutler-Hammer Starters always in stock at your local distributors—larger sizes immediately available from the factory. We hope you'll make your own feature-by-feature comparison between the Cutler-Hammer line and any other starter on the market. Look especially carefully at such vital advantages as ease of installation, high interrupting capacity, coil construction and accessibility.

Regardless of what features you select as the criterion of superiority, we're sure you'll choose Cutler-Hammer after you've made your unbiased comparison.

If you're one of many companies being forced to stock two sets of parts because of design changes, now is an excellent time to standardize on Cutler-Hammer.

Call your distributor or local Cutler-Hammer Sales Office soon. Or write for Publication LO-70-U211.

WHAT'S NEW? ASK..

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Cutler-Hammer Canada, Ltd.; Cutler-Hammer Mexicana, S. A.

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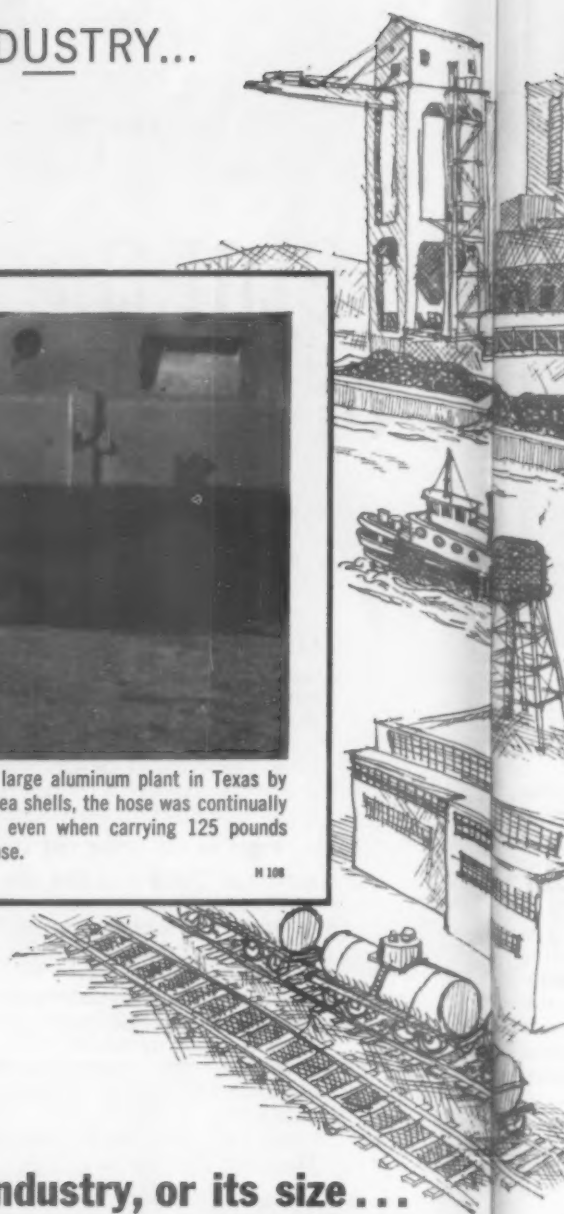
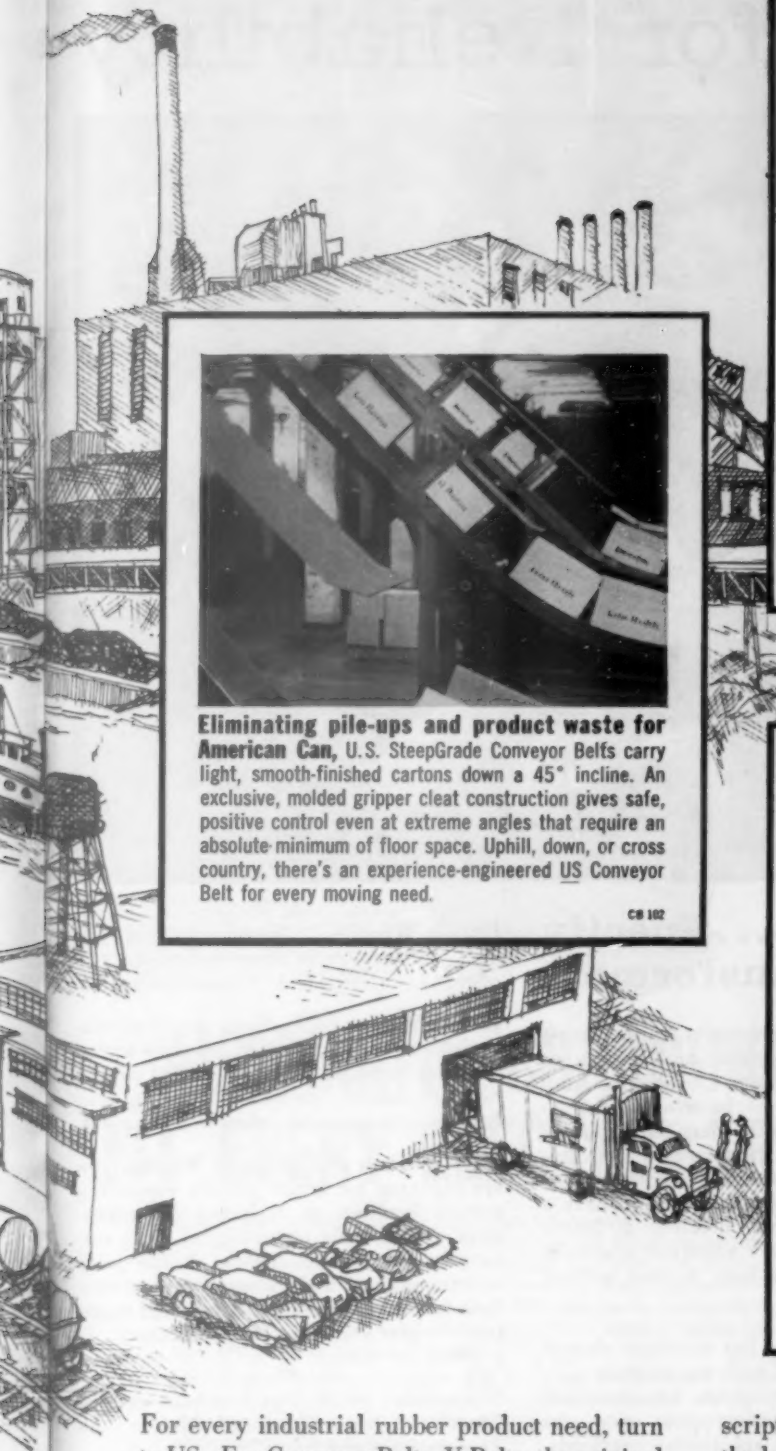
US AT THE HEART OF INDUSTRY...

The only hose built like a tire, U.S. Royal Cord Air Hose amazed builders of a large aluminum plant in Texas by its ability to withstand abuse. Lying unprotected on a road surfaced with abrasive sea shells, the hose was continually run over by heavily loaded trucks and even 50-ton cranes — showed no damage even when carrying 125 pounds pressure! Little wonder users have made US the world's largest manufacturer of hose.

H 108

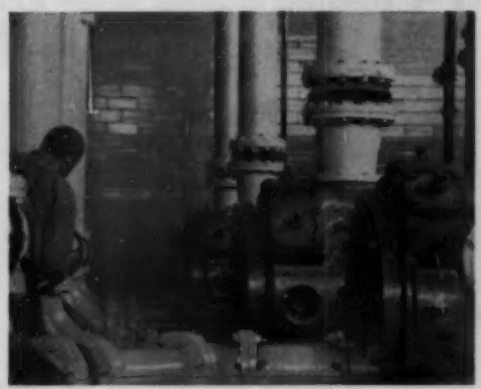


Whatever the time, the place, the industry, or its size . . . odds are you'll find US there. As the world's largest manufacturer of industrial rubber products, U.S. Rubber knows not only the needs of industry, but the answers to those needs. And industry knows US for it.



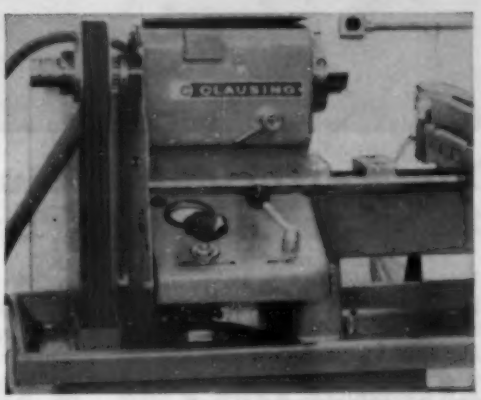
Eliminating pile-ups and product waste for American Can, U.S. SteepGrade Conveyor Belts carry light, smooth-finished cartons down a 45° incline. An exclusive, molded gripper cleat construction gives safe, positive control even at extreme angles that require an absolute minimum of floor space. Uphill, down, or cross country, there's an experience-engineered US Conveyor Belt for every moving need.

CB 102



655 US Expansion Joints serve Cincinnati sewage plant. Installed in the Mill Creek Sewage Works, one of five plants that will treat 120 million gallons of sewage daily, US Expansion Joints are used exclusively between the pumps and long runs of heavy cast-iron pipe to allow for expansion and contraction, protect against vibration, and keep damaging weight off the pumps.

EJ 101



The abuse of continual starting and stopping was no problem for the U.S. Royal V-Belts used on this Clausing semi-automatic boring and turning lathe. These belts were selected because they ran cool, took little space, were exceptionally high in power-transmission efficiency. They proved to be the most uniform and smoothest running of many belts tested.

VB 105

For every industrial rubber product need, turn to US. For Conveyor Belts, V-Belts, the original PowerGrip "Timing"® Belt, Flexible Couplings, Mountings, Fenders, Hose and Packings . . . custom-designed rubber products of every description. Discover why U.S. Rubber has become the largest developer and producer of industrial rubber products in the world. See your U.S. Rubber Distributor or contact US directly at Rockefeller Center, New York 20, N. Y.

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

United States Rubber

MECHANICAL GOODS DIVISION

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SILICONE NEWS from Dow Corning

Blueprint for Reliability

For Performance Plus...Specify Silicone Insulated Transformers

Here's Why—(1) ***Low cost installation*** . . . transformers using silicone insulation systems are up to 50% lighter, 50% smaller and require no costly vaults or barriers. (2) ***Lower operating costs*** . . . silicone insulated transformers are virtually maintenance-free — have no liquids to filter or change — need no space heaters to keep de-energized windings dry. (3) ***Maximum safety*** . . . silicone insulated transformers are completely dry. There's no danger of toxic fumes, or fire. (4) ***Maximum reliability*** . . . silicone insulated transformers operating at 200 C have a longer life expectancy than Class A transformers operating at 100 C. Depending on design, silicone insulated transformers withstand overloads of 25 to 50% above rated capacity. Units have been flooded without damage to windings.

Here's How — Dow Corning silicone insulation has excellent electric strength and is unaffected by thermal cycling and high temperature . . . enables transformer manufacturers to (1) produce lighter, more compact units — units that double capacity without increasing space or weight requirements; or (2) build units that withstand substantial overloads.

Here's What — Silicone insulated dry-type transformers in three enclosures: (1) open, (2) enclosed and (3) gas-filled sealed.

Here's Where — For load center substations, a choice of enclosed, open or sealed gas-filled dry-type transformers that require no costly vaults—can be located on roofs or balconies to conserve valuable floor space.

Here's When — Right now! Whether you are planning for future growth, expanding present facilities or replacing old equipment, consider the possibility of using silicone insulated transformers. Initial price is competitive, and, when you consider their lasting values, silicone insulated transformers give you more for your money . . . a whole lot more!

Write today for 8 page brochure entitled "Specify Silicone Insulated Motors and Transformers and Save!"

You Save by Specifying Silicone Insulated Transformers. Write Dept. 4422.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

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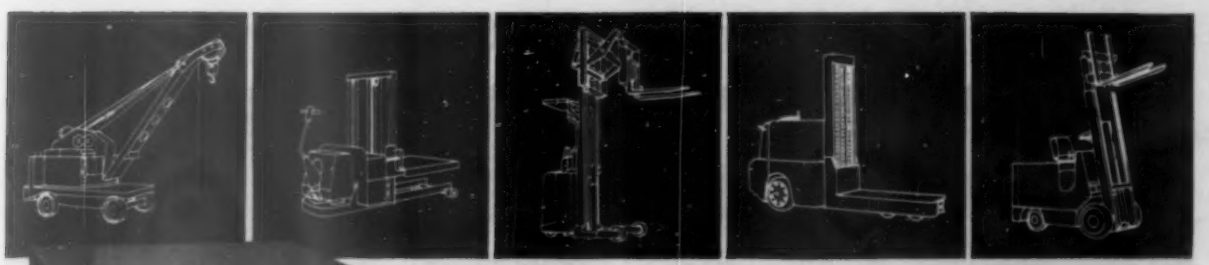
FACTORY



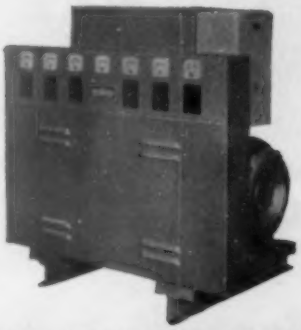
RECTIFIER CHARGERS SINGLE AND MULTIPLE CIRCUIT

A complete line of fully automatic, magnetic amplifier controlled, solid state rectifiers to fit any industrial truck application.

MOTOR GENERATOR CHARGERS—SINGLE CIRCUIT

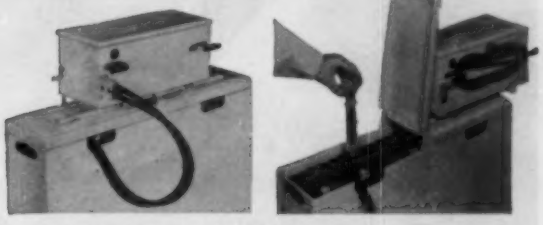
Low speed and noise level motor generator (1750 rpm)

Add flexibility to decentralized charging with these semi-portable, fully automatic models. Transistorized relay gives precise termination of charging cycle. Only AC service entrance connection is required.



MOTOR GENERATOR CHARGERS PACKAGE MULTIPLE CIRCUIT

These automatic chargers have transistorized relays for exact termination of charging cycle on each battery, shutting the motor generator down when last battery is charged. Only AC service entrance connection is required.



GOULD FULPOWR® UNIT

Fully automatic, complete power package (battery and charger) for hand trucks. Silicon rectifier charger slides to one side for easy battery servicing.

AUTOMATIC CHARGING EQUIPMENT TO FIT EVERY ELECTRIC TRUCK INSTALLATION

Gould now offers charging equipment for every type of installation —plus the facilities to manufacture special chargers of any kind. All units have completely automatic controls for starting and terminating the charging cycle—comply with Industrial Truck Association charging standards. It's the most complete line of charging equipment available to keep your motive power batteries operating at maximum strength.

Gould specification engineers will be happy to assist you in selecting the proper charging equipment for your particular needs, and to help set up battery maintenance procedures. *Ask for our new charging equipment catalog.*

GOULD ELECTRIC TRUCK BATTERIES

A complete line stocked nationwide for fast delivery. Precision engineered to give you sure, positive power.

More Power to you from GOULD®

INDUSTRIAL BATTERY DIVISION

GOULD-NATIONAL BATTERIES, INC.

St. Paul 1, Minnesota

Better products, *faster*, from your National Seal distributor:

This is no surprise package

When you open a box of National Oil Seals, you know exactly what to expect . . . a quality product. Micro-Torc® leather and Syntech rubber seals are results of the finest engineering, design and testing techniques. They protect bearings better and longer.

To keep machinery running smoothly, replace used seals with new National Oil Seals. Your bearing specialist will help you set up a service stock with the right seals to keep your standby inventory in balance. (National Oil Seals are phosphate coated to protect against rust and corrosion while in the crib or shelf.) Call him today.

NATIONAL OIL SEALS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

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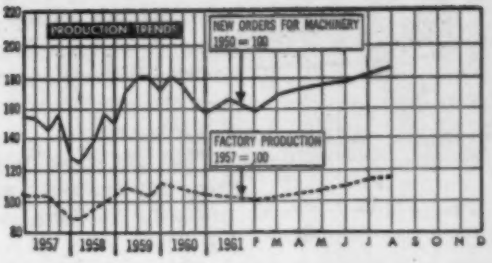
LOOKING AHEAD IN BUSINESS

A FACTORY PRESS TIME REPORT

FACTORY FIGURES OF THE MONTH

Indicator	AUG.[P] 1961	JULY[r] 1961	AUG. 1960
New Orders for Machinery (exc. elec.)[1]	187.0	185.0	174.0
Contracts for Industrial Construction[2]		110.0	149.0
Factory Production[3]	113.0	112.0	108.0
Consumers' Prices (cost of living)[4]		128.1	126.6
Industrial Prices (materials, supplies)[4]	127.4	127.4	128.2
Manufacturing Employment (millions)[5]	16.2	16.0	16.4
Total Employment (millions)[5]	53.4	53.1	53.3
Unemployment (millions)[5]	4.5	5.1	3.8

P = preliminary r = revised



Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1957 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Labor, Bureau of Labor Statistics.

Spending plans buoy recovery spirits

THE OUTLOOK | **Working hard to recapture ground lost in the first half, capital spending looks good for the rest of the year. Growing consumer income and new autos should keep trend moving well into '62.**

Business will move briskly to higher and higher ground for many months to come, judging from a recent Commerce Department report on capital spending. The report shows spending had reached its trough in the second quarter of this year, and will be increasing steadily in the months ahead. This rebound in capital expenditures extends recovery to all major sectors of the economy.

Another dominant factor in recent business expansion has been a reversal in inventory policies. After reducing stocks at a $4-billion annual rate in the first quarter of the year, cutting production and employment, companies have since been adding steadily to inventories.

Inventory building will continue in the months ahead, adding fuel to the business expansion. Significantly, the current inventory buildup does not harbor economic instability. Reason: business sales have grown faster than inventories. And materials and finished products being stored up are needed to meet growing customer demand. If stocks can be kept in line with growing sales, sharp inventory cuts need not be feared for the future.

A look at manufacturers' order volume in recent months gives even clearer reasons for the rebound in business investment. Since the beginning of 1961, monthly new order volume has swelled by $2.5-billion. Producers have expanded output to meet this growing demand, and will continue to do so in the approaching weeks. As a result, manufacturers soon will be operating at about 85% of their productive capacity.

At that point, the need for plant expansion will be felt. And, importantly, by that time earnings will be sufficient to enable firms to make the capital outlays they feel necessary. This combination of factors points to a steady rise in capital expenditures that is likely by mid-1962 to put outlays 20% above current levels.

Companies are not spending in a vacuum. Consumers, too, have stepped up spending in recent months. Durable goods sales, hard hit during the slump, have taken a sizeable jump since last spring. And the months ahead promise even more substantial gains as new autos and appliances exert their influence on consumers' growing incomes.

Growing industrial output will assure fuller employment and additional income gains for consumers in months ahead. From their rising earnings consumers can thus finance more cash and credit purchases of major durables. Clearly, then, the current economic expansion is on a solid foundation, with business firms and consumers, as well as government, increasing their spending. It would appear that only a major change in international stability could change this outlook.

WASHINGTON WIRE

A FACTORY PRESS TIME REPORT

One of the major legislative battles of recent years—over tariffs and trade—is shaping up for next year. The Reciprocal Trade Act, cornerstone of this country's foreign trade policy, expires June 30. Protectionists, whose strength has been growing in Congress, are out to cut the program. The Kennedy administration wants freer trade, authority to cut tariffs even further—as did the Eisenhower administration before it.

This fight is vital to plant men—involving, in one way or another, almost everything they buy and a good share of what they sell. President Kennedy started preparing for the battle even before the first session of the 87th Congress adjourned. His advisers are talking about the possibility of domestic subsidies in return for tariff cuts. Outcome of the reciprocal trade fight is in doubt. But it's a good bet that any new tariff concessions made by Congress will be made grudgingly.

Assessing its record in the first session of Congress, administration officials privately expressed some glee. With a couple of glaring exceptions, they got most of what they wanted. But that all depends on your point of view. Sen. Everett M. Dirksen (Ill.), Senate Republican leader, puts it this way: "The new frontier . . . follows a purported line of growth through spending . . . through achievement of a kind of collectivism by small doses. It seeks to firmly face up to the communist menace abroad by toying with the collectivist view at home. But at long last the choice will have to be made. We cannot have it both ways."

Controversy is developing too over bills to strengthen the antitrust laws. This, also, will come early in the new year. Sen. Estes Kefauver (D-Tenn.) wants time to build support for the measures by a series of hearings scheduled through the fall and early winter. The bills generally would increase penalties for antitrust violations, price-fixing and market dividing, and make corporate officers liable for actions of their subordinates. Strengthening of the laws will result, but Kefauver's package as such does not have much chance.

President Kennedy's record in the first session of Congress was mixed. He suffered drastic legislative setbacks. For example, in summary rejection of his plans for a multi-billion-dollar aid-to-education program and a tax credit for corporate spending on new plant and equipment. Both these measures will come up again next year. But general feeling is that they are dead for some time to come. Revision of depletion allowances and depreciation rates also will be proposed in 1962. But next year's budget is not expected to have room for any type of tax cut.

Kennedy got pretty much what he wanted in foreign aid—finally. The house tried to cut the program to bare bones but the Senate restored most of the funds. The President did not get authority to borrow funds from the treasury for long-term projects. But he did get authority to commit this country to such projects, with Congress retaining annual appropriation rights. He also got authority to create a $5-million revolving fund to buy capital equipment—all the way from machine tools to tractors—from government agencies for shipment to needy foreign countries.

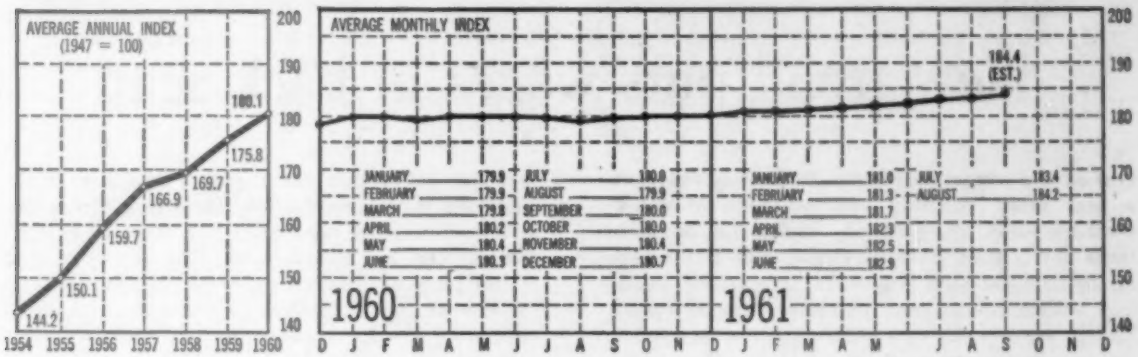
The President's biggest single legislative victory was enactment of a billion-dollar housing program. This should afford a major boost to the weakened housing industry and its suppliers. In addition, Congress voted new subsidies to aid slum-clearance programs and larger federal loans and grants to help depressed areas attract new industries. Creation of a department of urban affairs was put off until next year.

A bill to grant federal funds to help retrain workers in depressed areas was stalled by the House Rules Committee. It will come up early next year *only* if the unemployment rate remains high. Congress voted a temporary extension of unemployment compensation benefits, financed by higher taxes on employers.

Kennedy compromised on minimum wages but did get his $1.25 an hour figure in two stages. He also got liberalized social security benefits, including optional retirement for men at age 62—to be paid for in higher taxes.

COST INDEX OF PLANT MAINTENANCE

A FACTORY PRESS TIME REPORT



For tenth month, costs are up

	AVERAGE 1960	AUGUST (Preliminary)	JULY (Revised)
Building and Facilities Index	178.6	174.7	174.7
Materials	140.1	138.1	138.9
Brick	154.9	155.2	155.2
Elec. fixtures	131.9	130.9	130.9
Elec. switches, boards, fuses	183.3	183.2	183.0
Elec. wire, copper	147.0	142.4	142.4
Glass	148.1	147.7	147.7
Gutters, spouts, ducts	180.3	180.4	180.4
Gypsum products	140.9	145.3	142.4
Heating equipment	125.5	115.6	121.1
Lumber	128.7	122.0	123.6
Millwork	156.7	149.8	151.8
Paint	130.2	134.3	134.3
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.7	188.7	188.7
Pipe & tubing, copper	151.5	126.2	116.9
Roofing	113.9	121.4	121.4
Sanitary fixtures	162.4	161.8	161.8
Sash, metal frame trim	137.4	137.0	137.0
Solder	122.5	138.0	136.9
Steel, structural	236.3	236.3	236.3
Tanks, steel	139.6	136.7	136.7
Valves & fittings	167.8	163.7	163.3
Wire mesh	163.8	156.7	156.7
Labor	191.0	199.1	198.6
Carpenters	177.3	186.0	185.5
Electricians	199.4	207.8	206.8
Painters	196.2	203.6	203.6
Equipment Index	184.2	188.2	187.1
Materials	177.6	179.0	178.1
Abrasives	157.9	157.4	157.3
Alloys, non-ferrous	123.2	134.7	135.7
Bars & plate, steel	227.2	227.2	227.2
Bearings	160.0	152.9	155.4
Belting	160.9	163.2	163.2
Bolts, nuts & screws	225.2	244.6	236.2
Chain	187.4	193.8	193.8
Controls (electrical)	183.3	183.2	183.0
Gear-reduction units	181.1	174.5	174.5
Hand tools, mechanics	204.5	208.3	208.3
Lubricants	125.7	125.7	125.7
Motors	145.0	133.5	137.0
Non-ferrous metals	135.8	129.2	129.2
Precision tools	158.2	166.2	166.2
Pumps	235.4	197.0	197.0
Tools, cutting	186.8	182.1	182.1
Valves & fittings	167.8	163.7	163.3
Labor	188.7	194.3	193.1
All mfg. labor	185.1	190.8	189.2
Machine tool labor	192.1	197.8	196.3
FACTORY'S COST INDEX	180.1	184.2	183.4

Plant maintenance costs, as measured by FACTORY's index, took an unexpected turn upward in August to 184. The index stood at 183.4 the month before. It was the tenth consecutive increase.

Manufacturers held workers on the job for longer periods in August, sometimes running to overtime. This boosted labor costs in both major components of the index. Materials costs were mixed with no decisive trend either up or down. In that respect, materials costs for plant maintenance paralleled the course of all industrial prices reported by the U. S. Department of Labor—no change between July and August.

In the building and facilities section of the cost index, materials prices eased 0.8 of a point, paced by lumber millwork, and heating equipment. Douglas fir and other softwoods prices were particularly affected as new orders fell off. In addition, the dollar value of residential building, which accounts for a large share of lumber and wood products output, dropped 1% in August. Strangely, though, gypsum lath and wallboard prices were marked up in August. This action offset to some extent the declines for lumber and millwork. Copper prices, which have been doing the "cha-cha-cha" recently, in response to shifting world conditions in the copper producing areas, did it again in August. In that month the index of copper pipe and tubing prices scored a 9.3 point rise.

A definite upward trend was apparent in the labor costs area of the building and facilities section. The index of carpenter's wages was marked up 0.5 of a point. Costs for electricians were up 1.0 point.

Turning now to the equipment index, both materials prices and labor costs rose in August. Led by an 8.4 point rise for nuts, bolts and screws, the overall index of materials prices rose 0.9 of a point. The big gain for nuts and bolts was partially offset by a dip of 2.5 points for bearings and a 1.0 point decline for nonferrous alloys.

LOOKING AHEAD IN LABOR

A FACTORY PRESS TIME REPORT

New trend puts wages in back seat

Out of the bargaining battle in Detroit emerges a new labor contract concept sure to cause tremors—and changes—in industrial negotiations for a long time to come. The new breakthrough follows such landmarks as pensions, health and welfare benefits and guaranteed annual wages. Though born in the auto industry, it can be applied throughout industry. And union leaders will try to do just that—starting with the big steel negotiations in 1962.

In broad terms, labor is out to make the industrial worker into a salaried employee. Not necessarily in the size of his paycheck but in its regularity. The goal is 52 paychecks a year, regardless of the ups and downs of the business cycle, which in traditional business practice has meant periodic unpaid layoffs.

The Reuther plan, which rival AFL-CIO leader David J. McDonald will try to extend in the next round of steel talks, provides weekly pay for unworked hours in the auto industry. In essence, it guarantees a 40-hour week even when work is not available—though not at full pay.

It works this way: When the automakers schedule a short workweek, the employee is paid 65% of his take-home pay for hours not worked, up to a total of 40, (a $2.40-an-hour worker would receive $14.56 for a lost day's work on a four-day week, compared with his regular $22.40 a day). In an unscheduled short workweek, caused by bad weather or some other unforeseen event, management will pay the worker half his regular pay for the unworked time.

Wage hikes, as such, are taking a back seat in the union quest for job security. Auto worker wages, in the new agreements, rise no faster than in the past three years. And the contracts extend this trend for another 36 months. The bigger costs, more than the flat pay hikes, come in the extended fringe benefits. This makes such fringes as higher pensions, better health and welfare benefits, job transfer payments ($580 for employees involved in auto plant shifts) more important in the labor view than the going wage. This long-sought search for job security started in 1955 with the demand for guaranteed annual wages. Since then it has been a special point of union concentration because of job threats and dislocations caused by advancing automation. Like past bargaining breakthroughs, it now becomes the bottom rung of a ladder which other labor negotiators will climb upon—and seek to move up. Case in point: Reuther was the first to get supplementary unemployment benefits for a 26 to 39 week period. McDonald's steelworkers improved this to 52 weekly payments. Reuther's new contracts now raise SUB pay to a full year. They hike the weekly maximum from $30 to $40.

•

In addition to the new Reuther formula, labor leaders will have other variations of the same contract theme to push at the bargaining table. One in particular, is most likely to become popular. It is the new contract between Armour & Co. and two meatpacker's unions, representing 15,000 employees. The pact provides details for the newest of the automation-bargaining terms, called "technological adjustment pay."

The Armour agreement is the successor to the old "automation fund" agreement. These pacts—which set up a $500,000 fund to pay automation-displaced workers for retraining and relocation—were among the first in industry. Actually, they proved a bust (FACTORY, July '61 p. 61) when it was discovered that most employees were incapable of retraining for new skills or were reluctant to move to new assignments and new areas.

This time, with the help of money left over in the automation fund, Armour agrees to pay up to a year's pay—at $65 a week—to veteran employees who lose their jobs because of plant shutdowns.

These conditions are part of the agreement:

- The company will give three-months' advance notice of a plant closing. Full wages will be paid during these first 90 days.
- Employees with five to 15 years seniority can collect pay for 26 weeks. Those with a 25-year work record are paid for 39 weeks.
- To receive weekly allotments, employees must state their willingness to be transferred to available jobs in other company plants. Employees with five years seniority may claim severance pay in lieu of technological adjustment pay—if they do not want to accept the relocation offer.

SEE LABOR RELATIONS NEWS, PAGE 202

YOU CAN COUNT ON POWELL VALVES

Performance proves it, year after year—you can count on Powell Valves to help you solve the toughest flow control problems of handling water, oil, gas, steam, air or corrosive fluids.

This truly dependable performance results from many things—among them Powell's engineering know-how, accumulated during 115 years of valve manufacturing . . . and skillful use of the widest selection of quality materials—bronze, iron, steel and alloys.

Then, too, you can count on getting the Powell Valve you need, when you need it. That's because Powell maintains a network of distributors backed up by factory inventories, warehoused "ready to go."

Get the full story from your nearby Powell Valve Distributor, or write us direct.

200-pound Bronze Globe Valve—Fig. 102. Union bonnet. Renewable nickel-bronze seat and disc. Sizes, ⅛" through 3". Angle and flanged end valves available.

150-pound Bronze Gate Valve—Fig. 2714. Union bonnet. Inside screw rising stem. Sizes, ¼" through 3" with solid wedge; ½" through 3" with split wedge.

150-pound Bronze Globe Valves—Fig. 150. Union bonnet. Renewable composition disc. Sizes, ⅛" through 3". Angle and flanged end valves can be supplied.

150-pound Bronze Gate Valve—Fig. 1414G. Bolted, flanged yoke-bonnet. Outside screw rising stem. Solid wedge. Sizes, 2" through 12". Screwed end valves can be furnished.

See our catalog in Sweet's

115th year of manufacturing industrial valves for the free world

POWELL DEPENDABLE VALVES

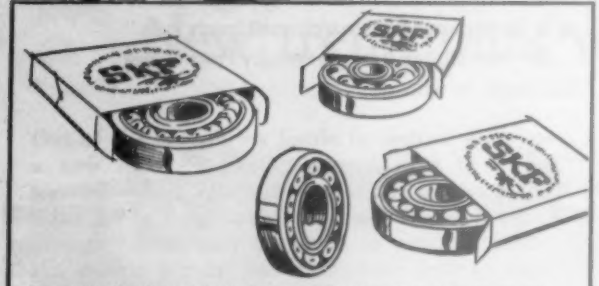
THE WM. POWELL COMPANY CINCINNATI 22, OHIO

For more facts Circle 455 on Reader Service Card

DISTRIBUTOR DAN, the SKF bearing man, shows

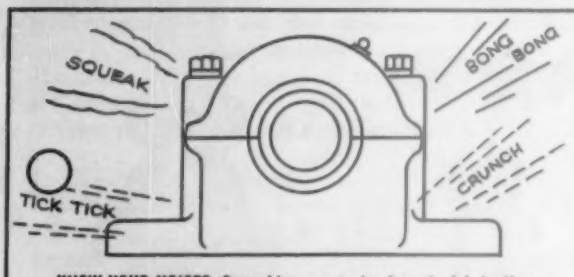
HOW TO CHECK BEARINGS DURING RUN-IN

—to prevent damage and downtime later!

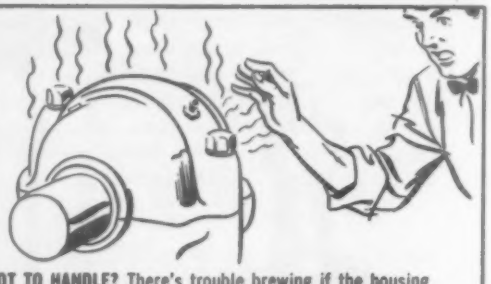


THINK BEFORE YOU INSTALL THEM. The first few hours of operation are the most critical in a bearing's life. So, operate the bearing at reduced speed and load during run-in. Bearing run-in periods vary from a few hours to a few weeks, but 24 hours is usually sufficient.

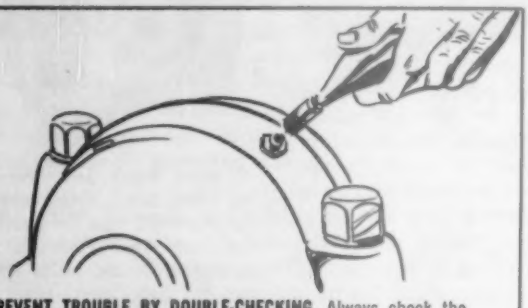
NOISE CAN BE A SYMPTOM. A soft, purring sound is all you should hear from a bearing—if it's operating correctly. Check by placing the blade of a screwdriver and listening at the handle. Any other noise means trouble sooner or later.



KNOW YOUR NOISES. Squeaking means inadequate lubrication. Metallic tones indicate shaft or housing interference or improper adjustment. Smooth, clear tones tell of marks in the stationary raceway. Intermittent noises indicate a damaged ball. Crunching means dirt.

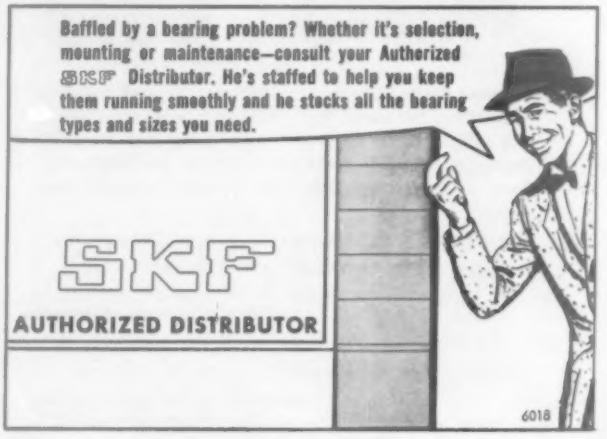


TOO HOT TO HANDLE? There's trouble brewing if the housing feels excessively hot. High temperature usually indicates overlubrication or use of a lubricant with too high viscosity. It can also be a sign of excessive axial or radial preloading, misalignment, tight-fitting seals, or rubbing.



PREVENT TROUBLE BY DOUBLE-CHECKING. Always check the bearing after the critical run-in period. Examine the lubricant. If it's dirty, change it. Check the seals for signs of wear or damage. A few minutes spent double-checking now eliminates chances of costly damage and downtime later.

Baffled by a bearing problem? Whether it's selection, mounting or maintenance—consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.



SKF MOTION ENGINEERING

Advanced ball and roller bearing technology

For more facts Circle 456 on Reader Service Card

FACTORY

So much to do

Rarely before in our history has the man who manages in manufacturing faced so many difficult problems. Take them at random:

. . . *Stiffer quality demands.* The sales departments demand it because your customers demand it. Not that they expect to pay for it. It's going to be up to you to build more fail-proof quality into your product without raising costs. This can be done, say the experts, by organizing for "total quality control" of appraisal, failure, and prevention. It would drop total quality costs from 8¢ to 10¢ out of every sales dollar to 6½¢.

. . . *Less fat to cut.* In material handling especially, long-time cost-cutting has removed the easy savings. Total cost of material handling has trended downward. But it still represents more than 15% of manufacturing labor cost. Squeezing dollars from this amount now will call for courageous, sweeping changes.

. . . *Improved foreign know-how.* Others than the Russian orbiters have pricked our pride. Foreign manufacturers have taken giant steps in improving their operations. This is true in managerial methods as well as in engineering techniques. What America has taken 50 years to develop, our competitors abroad have learned from us since World War II. And there's small reason to believe that they won't now go ahead rapidly under their own power.

. . . *Threats of mobilization.* And all that war or fear of war entails for American industry. Government controls, priorities, allocations are now no further away than tomorrow. It's become increasingly evident that a nation cannot be prepared for a nuclear war under peacetime conditions. The United States must soon convert its manufacturing facilities into a war machine ready to roll if and when it is needed.

. . . *Nagging unemployment.* Outside of war, the most difficult management and engineering problem you can face. It's a problem that the government, together with labor unions, may well solve without your help unless you assert your interests and demonstrate your effectiveness.

These problems overlay the multitude of everyday troubles that dog the days of plant management. They are not insolvable any more than the ordinary ones are. They will, however, require recognition on your part—and iron determination to do the job that only management men and engineers in plant operations are capable of doing.

L. R. Bittel

EDITOR-IN-CHIEF

TOMORROW'S S

Meeting at the Advanced Management Institute (Dayton, Ohio) to discuss and analyze the topic "Preparing Now For Tomorrow's Management," the men shown here considered four basic questions:

1. What changes and developments are in view for Tomorrow's Manager?
2. How will these developments affect management organization structure?
3. What qualifications will the new manager need?
4. How will we select and develop the new managers?

Here is a sample of their thinking:

The changes will revolve, for the most part, around the new technology. Middle management is likely to feel the greatest impact. Computers will take over some decision-making. Staff functions may well be "re-integrated" into line departments. Supervisors will operate on a higher level, with broader responsibility. They'll have to be tactful, sophisticated—more truly *managers*. This calls for a higher caliber man. Some won't make the grade.

Minutes of the whole meeting fill 52 pages. We've picked out a few remarks on each question that show what the experts see in your future.

What changes and developments are in view for tomorrow's managers?

Schaeffer. Although we have talked a lot about the impact of automation on the supervisory level of management, I think its strongest effects will be felt in middle management.

Healey. I agree. I don't see middle management being replaced as some authorities have been saying. Some of the functions and activities of middle management will be performed by computers, but these are not *managerial* activities in the true sense. I see the computer relieving the manager of a lot of routine decisions. This should free him up to devote more time to policy and truly managerial functions.

George. Will this mean fewer levels of management?

Healey. I think it will. I think that middle managers,

"We'll see fewer levels of management. Some companies are already eliminating first-level supervision, or at least upgrading it by increasing the scope of operations they manage." Dr. James H. Healey, Director, NMA Advanced Management Institute.

"Line and staff functions may be fused. In some of our highly automated departments, the maintenance men are part of the operating department." Frank Schaeffer, Director of Personnel Services, National Tube Division, U. S. Steel Corporation.

since they will be free to do *management* work, will find their span of control much broadened.

Mee. Of course, this has tremendous implications for the type of manager that is required. We're suggesting a broad-gauged man whose scope of knowledge and understanding far transcends what is typical today. He'll need to understand the process of management itself. He is going to have to know something about a number of specialties himself, in order to coordinate and integrate them.

Healey. I think we're beginning to recognize management as a skill in itself. We can see the possibility of running a company with fewer people classified as managers, but each of them more completely occupied with the managerial function than some of the people we have labeled as managers now.

Schaeffer. But if we direct our attention to the first levels of supervision, do we really see this happening? In my observation, just the opposite often happens. Electronic equipment, for instance, has reduced clerical work to a considerable degree. But in one installation after another, we find there is a little clerical work left over. It still must be done, so we pass it on to the foreman. Usually, these are details that require just a little bit of time, but they keep adding up to the point where it becomes a pretty substantial part of the supervisor's job. The actual time required tends to become greater than it was before we installed the computer.

How will these developments affect management organization structure?

George. Because of greatly increasing technology, specialized staff functions have tended to be detached from the line organization. These staff organizations have become more or less autonomous in many cases. Dr. Mee sees the possibility of a reverse trend, in which staff functions are reintegrated back into the line organization.

Hjerpe. Yes, that's true. At our division, we have four basic production units, each headed by a production

"He'll have to be a very sophisticated generalist, who understands the relationships not only between complex functions but within a complex web of authority." Dr. John Mee, Chairman, Management Department, Indiana University School of Business.

"Managers of tomorrow will have to be highly trained in social skills. I see the first level supervisor having a terrific job motivating people." John McIntyre, Program Management Administrator, North American Aviation Corporation, Columbus Division.

manager. Each is responsible for buying its own materials, establishing its own production schedules, and supervising control activities. As we go down the management ladder, each one is expected to be completely responsible for his departmental unit.

These men now have control over many of the specialized functions that had been handled by staff people in the past. We have a more decentralized form of management. This has raised problems, of course. We are now requiring such things as cost control through operating statements and budgets. Each manager has to be more of a planner and organizer. All this makes it harder for the supervisor to come up through the ranks.

Mee. Yes, and this calls for a different organizational *concept* altogether. We have tended to take away certain specialized functions of the line manager and give them to staff specialists. This led to problems of coordination, which we've tried to solve by establishing the objectives of each position and unit.

Now if the new trend toward re-integration catches on, it introduces a new concept. Instead of defining the manager's objectives in terms of specific activities, we focus on the ultimate goals—the production and distribution of our goods and services. In other words, the manager is responsible for the end results and he is given control over the means to achieve them.

George. Is this concept really catching on?

Mee. I think it's the trend in many organizations, but not enough time has passed to determine just how permanent it's going to be. One problem, you see, is that this requires managers of almost staggering qualifications.

Hjerpe. Well, I believe it's the trend in our organization. And it has, as you point out, raised the question of where do we get this caliber of person. We're finding it increasingly hard to take people out of the ranks and expect them to perform at this level. That's why our plans call for continuing to recruit college graduates both in engineering and business, and giving them work assignments and training that we hope will prepare them for this sort of thing.

Mee. Of course, one possibility is to take some of our staff specialists and make them line managers. But men in staff units often don't qualify for the line jobs; those jobs require a broader type of individual.

Healey. This suggests another question. In view of all of this, are we likely to see the number of managers increase or decrease? Are the units that remain under the line manager getting larger or smaller?

Mee. I think that the more automated, technical, and scientific we become, the smaller will be the ratio of managers to workers. For instance, you might have the ratio of one to five instead of one to fifteen. If the total work force remains about the same, this will mean more, not fewer, managers.

Schaeffer. I wonder, in our projections into the future, if we aren't tending to use some rules of thumb that can be quite misleading. In the case of the first level supervision, we automatically tended to think in terms of fewer supervisors. These assumptions have not been borne out by experience. For a given unit of production, even though a smaller work force is involved in the new method, you still tend to need just as many supervisors. In an automated operation, you may very well need closer supervision than before.

George. Staff re-integration may be a trend, but I think it's still off in the future.

McIntyre. Yes, I quite agree. The staff function is certainly increasing at the present time. The job of managing has become so complex and technical that line managers are forced to rely heavily on staff support. There always must be the central authority figure, the line man, but I think the tendency is to look more and more to the staff specialist for opinions and recommendations.

George. But this seems to point up a critical problem for higher level managers. Somewhere along the line, someone must establish a policy or make a decision on how to use the data provided by the staff. In the final analysis, it has to be a line manager. And this puts a tremendous burden on him, since he must somehow interpret and understand the information given him by highly specialized staff people. But there is quite a problem here. Some of the tools of decision-making—like operations research—are so complicated that they can only be understood by a specialist. Doesn't this really give the staff man a good deal of authority beyond just advising and recommending?

Mee. We have to distinguish between men with operational authority and those having technical authority. And our managers must understand the different types of authority and what they imply. This calls for a highly sophisticated type of manager. One who understands the relationships not only between complex functions but within a complex web of authority.

What qualifications will the new manager need?

Mee. Well, we've already agreed that the manager is going to have to be a broadly educated, high caliber type of person, who can deal with several areas of specialized knowledge and with abstract management concepts.

Healey. I'd add that he's going to have to know a good deal about psychology and social relationships.

Schaeffer. But I wonder if we haven't tended to exaggerate, somewhat, about how much more highly skilled the manager is going to have to be. Ever since I can remember, we've said that "the manager is going to have to be better than he has been."

Mee. That's true, and I don't suggest that the men we have now are not better in quality than they have been in the past. But it's a matter of degree. In the face of the rate of development we have had—and are likely to continue to have—the complexity of his job can't help but increase geometrically. Looking at what even the first levels of supervision will need to know, and what demands will be placed on them, the qualifications needed are staggering.

McIntyre. I agree with Dr. Healey that, particularly at the lower levels, managers supervising highly automated processes are going to have to be highly trained in social skills. I see the first levels of supervision having a terrific job motivating people.

Healey. I question, though, why the supervisor will

"There's a tremendous burden on the line manager, since he must somehow interpret and understand the information given him by highly specialized staff people." Norman George, Manager of Research and Development, The National Management Association.

"He'll have to know operating statements and so forth, and be more of a planner and organizer. This will make it harder for the supervisor to come up through the ranks." Harold Hjerpe, Plant Manager, Automotive Division, Bendix Corporation.

need so much *technical knowledge*. If a machine breaks down, for example, he's not the one who will repair it. All he needs to know is that it is not operating properly. The technicians would then be called in to fix it.

Schaeffer. But the foreman is responsible for the machinery he is using for his production. He might call for help from maintenance, but it's up to him to see that it's repaired. This requires him to know something about the machines. Incidentally, in many of our departments that have been automated, the maintenance staff is now part of the operating department.

Healey. That's a potential solution: break down the large staff organizations and assign and redistribute them among the operating departments. This may involve what some companies are already doing—eliminating the first level of supervision. Or at least upgrading this supervision by increasing the scope of operations that they manage.

How will we select and develop the new manager?

George. This leads to our last question—where are we going to get the people we have been talking about? Will it still be possible for employees to advance from the ranks? How are we going to develop this "generalist" that we talked about?

Schaeffer. We've experienced this problem of selecting and training supervisors to manage highly automated operations at National Tube. Since these generally have been newly established departments, we were able to be selective. And we haven't confined ourselves to choosing new supervisors from the ranks of present foremen. We've picked them from all over the organization, including non-production units.

Hjerpe. We have a recruiting department working primarily with engineers. Once they are hired, the engineers are put on a fifteen-month training program. Forty weeks are spent in the engineering section, fifteen weeks in the manufacturing section, and seven weeks in sales and advertising. We're developing these people primarily for engineering, but we find that more of them are interested in manufacturing than in design and research.

Schaeffer. That's typical. Many of our graduate engineers, too, end up in production jobs by their own choice. But this satisfies less than half the total needed in the management area, so we started a pre-supervisory training program a while back for rank-and-file workers, who are not college graduates. After careful screening we found that a very high percentage of these men are perfectly capable of learning and keeping up with modern techniques. All of our supervisors, of course, can't be presidents. But there will always be those who attain a level of advancement somewhat above that of the average working man and they will be perfectly happy with that accomplishment, and perfectly capable of handling the job. I see a continuing need for quite a long while for rank-and-file workers, carefully screened, being given on-the-job training in preparation for supervisory positions.

George. I think we will all agree that it would be a mistake to cut this source off.

Hjerpe. Oh, yes. If hourly workers felt there was no chance for advancement into the managerial rank, we would have little motivation or loyalty. We haven't divorced ourselves completely from bringing up people through the ranks, but those who do make the grade are the ones who've spent time developing themselves—largely on their own.

BRAINSTORMING MATERIALS HANDLING

Materials handling is constantly being improved and altered to meet the needs of increased production at Skil Corporation. Secret: Periodic informal brainstorming sessions by top and middle plant management men.

Located in Chicago where land is at a premium, physical plant expansion would be an expensive luxury. So Skil strives for maximum utilization of existing space without sacrificing convenience and flexibility. And they often do this without upsetting basic plant routines. It is done through teamwork.

When a problem arises or an efficiency idea is brought up, J. J. Topolinski, Vice President of Manufacturing calls a meeting with his top aides. Frank Jelnick, Plant Manager, and Karl Salanda, Production Manager (all on this month's cover) always sit in. Middle management personnel involved with the problem on hand also are invited. Together they kick the problem around until a decision is reached; this usually takes more than one meeting.

Though better materials handling methods is the main objective of these parleys, they delve in other plant operations problems as well. Safety, increased production, and greater efficiency have been by-products of brainstorming. On the following pages are typical examples of management ingenuity and teamwork.

MATERIALS HANDLING OVERHEAD HIGHWAY

Materials handling whenever possible is an overhead proposition. This overhead conveyor, for example, travels through the plant, then comes down at the packing stations. Each packing station is located at the end of the assembly line, so all the materials are brought together at one point (photo, left).

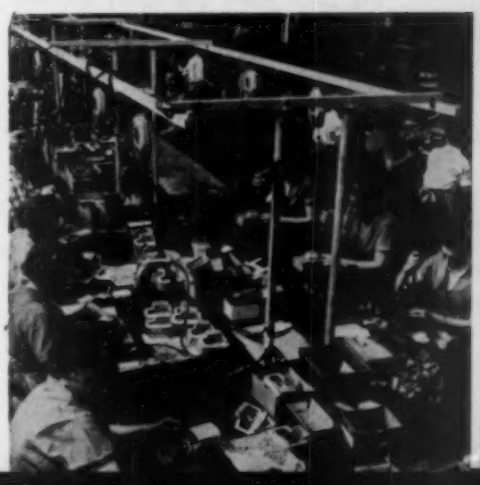
The two-section rubber belt is hung from the ceiling. At the head end, it's level with the second floor. It can be fed from the third story via a metal chute. Second floor loading is also possible because the chute can be moved out of the way. It is counterbalanced so that one man can easily move it.

Before the conveyor belt was installed, Skil had fork trucks traveling the length of the plant carrying materials to the packers, and then returning empty. Also the parade of fork trucks created congestion in the aisles.

Now it normally takes just one man to load the packaging materials onto the conveyor. And since the conveyor is located overhead, no usable production space is tied up.

. . . EVEN TOOLS MOVE OVERHEAD

Mobile air and electric tools are convenient to workers at any position along this work bench. They're hung from small skate wheels running in overhead tracks along the length of the assembly table. This gives flexibility by allowing work to be placed anywhere on the table and still have the required tools overhead.



Top and middle management skull sessions also resulted in these efficient ideas

SAFETY LIGHTS HEAD OFF ACCIDENTS

This fluorescent light signals danger to the operator of this radio frequency heating machine. The machine is used to glue sandpaper strips into belts. Exposure to RF can mean serious burns.

RF energy can light a fluorescent lamp even though there is no direct electrical connection. Skil made use of this fact by clamping a small 10-in. lamp on the platen. If it's lit, the operator is aware there is RF energy present. Thus she knows exactly when the operation is finished, and can pace her work better without danger of burns. Result: A production speedup.

Skil also applies the same technique to its electrostatic paint machine. When the foreman starts the machine in the morning, he hangs a long fluorescent light on the chain conveyor. If the lamp lights, he knows that the 100,000 volt machine is operating properly. If it doesn't, he makes the necessary adjustments. Thus the foreman has a safe and sure check, eliminating the time-consuming task of probing the electrodes with a measuring device.

INSPECTION ON THE LINE

Eyes can be deceiving but not with these Examolites (Macbeth Arc Lamp Company, Philadelphia).

All parts coming out of the electrostatic paint machine are checked for defects under these special lights. The lights give a daylight effect and all deviations from the color norm are easily spotted.

With ordinary lights, color gives the illusion of changing from morning to evening. Thus there is no common standard for accurate inspection. With the Examolites all parts are viewed under the same conditions through the day.

This allows inspection to take place right on the line so there is no wasted time in handling.

TOTING BY TENSION

Hanging small motor armatures on racks by one end of their shafts can be a tricky business. It confronted Skil in their motor department where armatures must be dipped in varnish, then carried through a bake oven.

Biggest headache: Keeping the varnish off the commutators.

Coil springs provided the answer. Here's how it works:

Spring wire is coiled into 14 turns at one end, drawn out and looped at the other end. One man slips the coil over armature shafts and hangs them by the loop on racks (photos above and left).

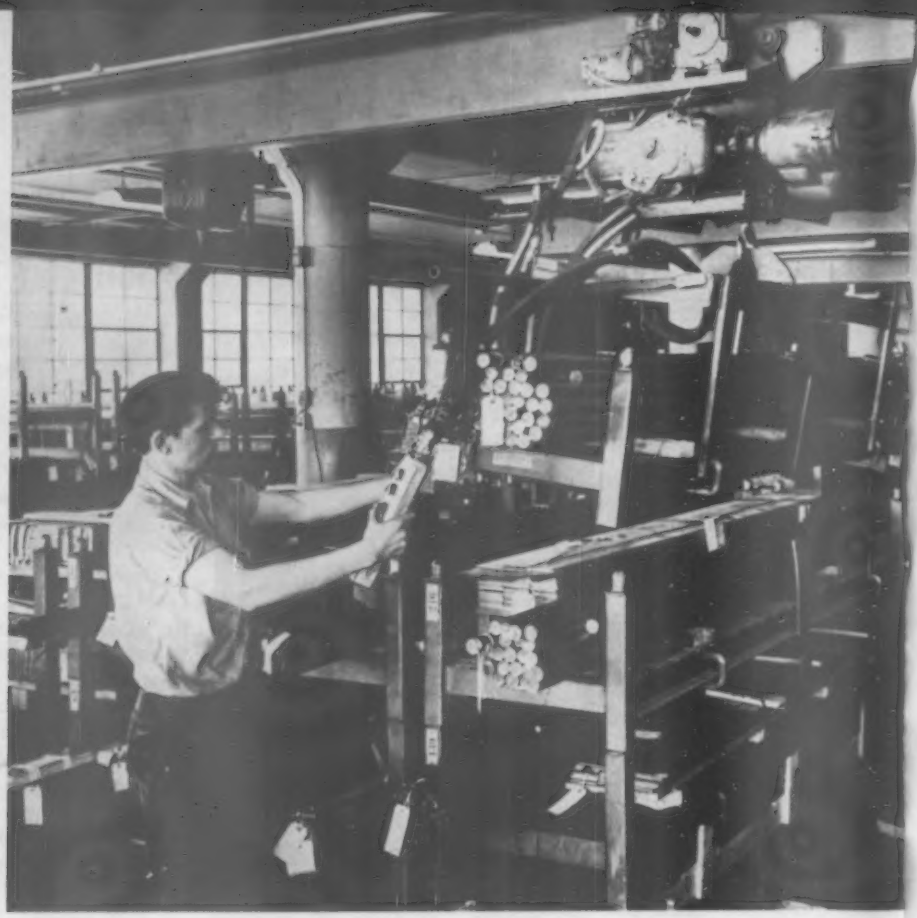
Racks are then hung on a chain conveyor which in turn carries them through the varnish dip and bake operation. There's no waste. At the end of the operation, the springs can be quickly removed and used over again.

Although the springs can be attached and removed very quickly, there's no chance of their coming loose and slipping during the operation. Spring tension holds the armatures fast.

The springs are inexpensive. They cost about two cents apiece to make, and Skil makes them in four different sizes to accommodate varying shaft diameters.

The bake oven itself was installed with space conservation in mind. It's suspended from the first floor roof. Not only does this save floor space, but all the heat goes outside —to the great comfort of employees.

Brainstorming parleys produced these efficient materials handling improvements



PORTABLE RACETRACKS

It takes just 15 minutes to convert a conventional straight line assembly table into a circular production line. The racetrack is portable and can be easily handled in sections by one man. It's used in peak volume periods to supplement the regular racetrack table shown in the photo to the right.

RACETRACK PRODUCTION IN JIG TIME

A special pegboard jig used with the racetrack roller assembly table eliminates excess handling. The pegs of this fixture hold and support the workpiece. Felt or rubber on each peg assures that the painted housing won't be scratched. The unique feature of this jig is that it is hinged in the center.

With it the operator can rotate the workpiece 90 degrees onto its side without ever having to remove it from the jig. Thus she has clear vision and can perform operations on the side of the workpiece with the overhead tools.

When finished, she simply rotates the jig back to a level position to

STOCK STORAGE SYSTEM SIMPLIFIES STACKING

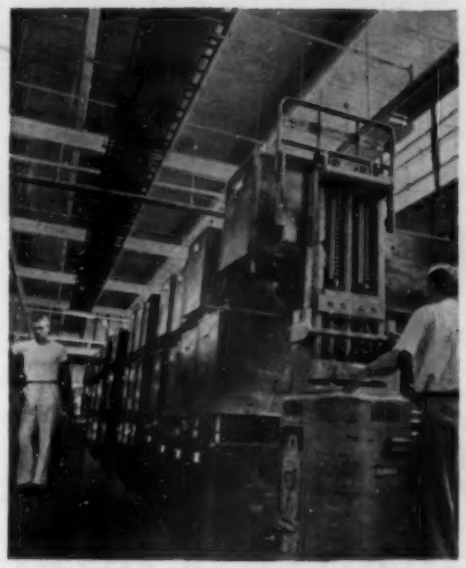
A specially designed stock handling system, custom-made for the plant's tram rail crane is paying multiple benefits. It reduces materials handling to a minimum, makes efficient use of vertical space, and provides safety for the operator.

Bar and sheet stock shipments are received in easily storeable sizes. Sheets are stored on their original shipping pallets, and the bar stock is loaded from trucks directly onto the special racks shown in the photo at left. The crane hook picks up adapters which in turn carry either the racks or pallets.

Bar stock racks are welded together from 2-in. square box sections and corrugated sheet. They can be stacked five high by means of couplings on the corners, but stacking is normally limited to three high for safety.

There's no need to unload the racks to deliver bar stock to production areas. Stock is taken directly to work stations on the racks. The tram crane picks them out of storage and loads them on elevating tables for delivery to production.

Sheet stock, stored on shipping pallets, is picked up with an 800 pound fixture. Variable width arms are snugged up against the pallet, and the crane picks up fixture and all.



work on the top and inside of the workpiece. No additional repositioning is required.

The flat back of the jig makes it easy to move along the roller conveyor.

Installation of the circular roller conveyor and jig system has boosted production some 40%.

CARTS LUG AND STORE

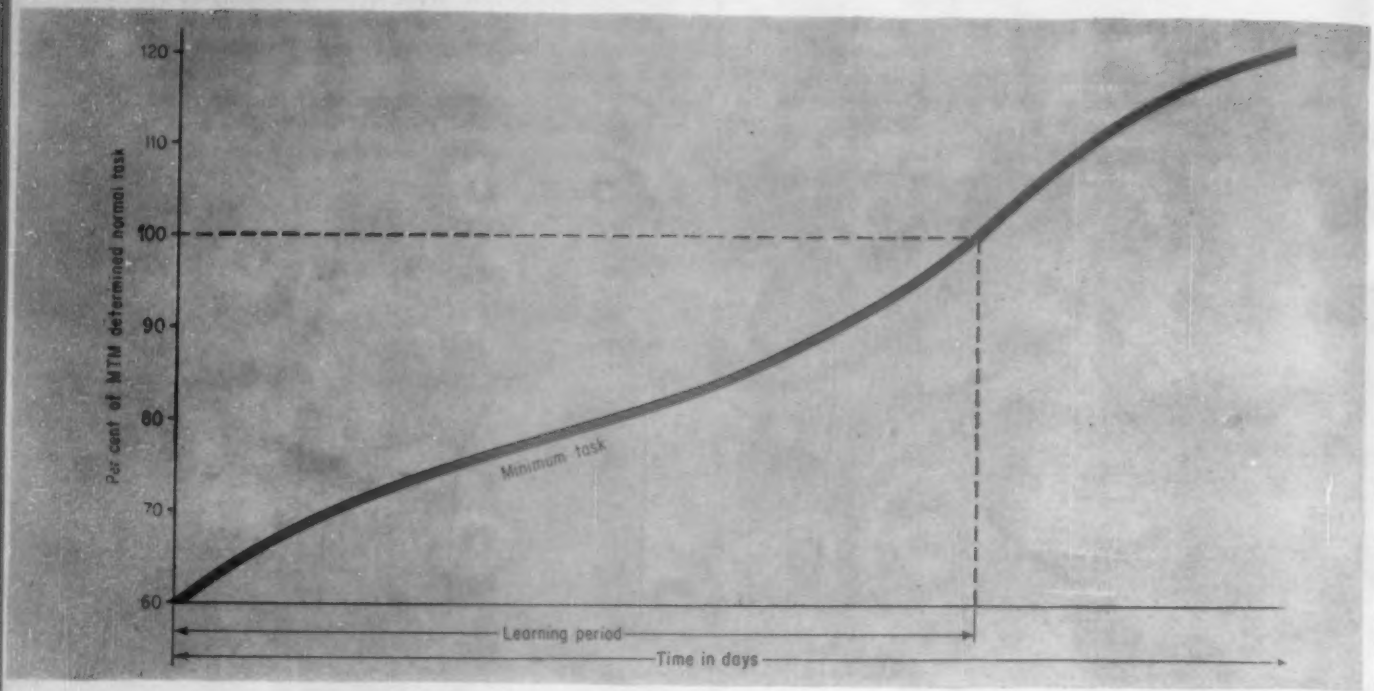
These wheeled box trucks are the key to small parts handling. Costing only $90, they have a storage capacity of 48 cubic feet and can hold 700 pounds.

Sides are made of 1-in. pine boards covered on the outside with steel sheets. Inventory cards, held in slots on the front, identify the contents for the foremen.

Placing steel pipes in each corner of the trucks allowed them to be used for storage purposes also. Screw machine fittings in the ends of the pipes allow stacking up to three high with the trucks fully loaded. As shown in the photo, stacking is done with fork trucks.

The stacking attachments for the trucks tripled space for parts storage.

This graphic formula develops realistic incentives for workers on short run jobs. It's simple enough for workers to know exactly what is expected of them each day. Using it, they learn faster, produce more, earn more.



Costs strike out with learning curve incentive

Short run operations are a headache to managers. Training group operators and bringing the group up to normal operation are mong the problems that make it so. Our company had the problem of inefficient short-run group operations. It solved the problem with an incentive system geared to a learning curve.

Incentives were not new with us. Our Industrial Engineering Department had used MTM (Methods-Time-Measurement) for years to set incentive standards on all direct labor operations. Incentives had increased production and lowered costs of routine repetitive jobs. Our question: Why not use this approach on short run jobs where the learning cycle was a major portion of the total length of the job? By setting a daily increasing incentive task for the learning period, desire could be stimulated in the group to learn new operations more quickly. Then, a bonus from the savings derived from faster learning is justified.

The result of intensive study and experimentation was a Learning Curve and Incentive Task Plan. This plan successfully answered three questions:

(1) How many days should it take for an operator to learn a new operation? (2) What should be the minimum rate per day that learning should take place, after which incentive would be paid? (3) How could the

By FRANK J. POWERS,
Manager of Industrial Engineering
A. S. R. Products Company Division of Philip Morris Inc.
Staunton, Va.

program be uniformly applied from job to job, whether one or fifteen operators were involved?

It was not as simple as it sounds, though. A. S. R. had a union contract with incentive provisions clearly spelled out. It did not include incentive learning plans. Additions had to be sold to the union committee. Since 95% of these short-run jobs never repeat, the union was skeptical about a universal solution. The system had to be easily understandable and lack ambiguity. It had to compensate for the size of the assembly line varying from one to fifteen operators without being complicated.

The mechanics of the program work this way. A standard reference curve for learning has been developed. It is pictured above. Learning period (horizontal axis) is plotted against percent of MTM determined normal task (vertical axis). The shape of the curve (drawn in color) never changes, but the horizontal scale does. Minimum learning periods were found to vary from three to ten days. For a three day learning period, the horizontal scale becomes three days. The coordinate at each of these three points becomes the minimum expected task for each day. Performance above these tasks is paid bonus.

Some psychological considerations went into the shaping of the rate of increase in this learning curve. Operators are traditionally suspicious of new incentive standards. They usually delay a few days before attempting to meet the standard. This becomes a continuing problem when 95% of the short-run jobs never repeat. By slowing down the rate of increase in the middle of the learning period, the operator more readily makes bonus. This gives him confidence and he is encouraged to meet the higher minimum task of the subsequent day. The base of 60% of normal performance for the first day of learning for all jobs is attainable and meets management's minimum requirements.

Four rules are the basis for determining the minimum learning period: (1) Determine the learning time for each work station in the group. (2) Select the longest individual learning time. (3) Add a group familiarization allowance when the group exceeds three operators. (4) Total the items listed under 2 and 3 to obtain the learning period allowed.

Here is an example:

Assume a group of five operators. The longest individual learning time is three days. Group familiarization allowance is two days. The total learning period allowed is thus five days.

Divide the horizontal axis of the learning curve into five equal parts. Read the percent task for each day from the curve: 60.0, 70.5, 75.5, 80.0 and 87.0%.

This is related to production and incentive payment in the following way. Using the five day learning period allowance from the example above, and assuming normal (100%) task to be 1,000 units for an eight hour day, a table of daily tasks and time allowances during the learning period is shown at the top of the next column.

Learning Days	% Learning Performance	Daily Task	Daily Allowance Per Operator In Hours
1	60.0	600	40.0% x 8 = 3.20
2	70.5	705	29.5% x 8 = 2.36
3	75.5	755	24.5% x 8 = 1.96
4	80.0	800	20.0% x 8 = 1.60
5	87.0	870	13.0% x 8 = 1.04
6	100.0	1000	0% x 8 = 0

Incentive payment throughout the plant is calculated by multiplying production times the standard set for 100% performance. In this case the standard is 0.8 man-hours per 100 units produced. Thus 600 units will earn 4.8 hours each for the group. Add the 3.2 hours learning allowance and the group has earned 8 hours pay for 8 hours work.

Assume the group produced 700 units for the first day. They earned 700 x 0.8 = 5.6 hours under the standard. Add the allowance of 3.2 hours and daily earnings become 8.8 hours pay for 8 hours work. The daily allowances are paid without regard to daily output. As long as the operator output exceeds daily task, the operator earns bonus. This is exactly what is desired. The operator is rewarded for learning quickly.

Typical performance on the first day is 104% increasing to 123% on the last day of the learning period. Performance then temporarily drops to about 110% subsequently increasing up to 125%.

How is the length of the learning period decided? The conference approach is used. Representatives of Manufacturing, Industrial Engineering and Industrial Relations get together and use these guide-posts.

The length of a learning allowance is determined by (1) the length of a standard cycle time and (2) by the manual complexity within the standard cycle time.

A simple operation that has to be performed 1,000 to 2,000 times in an eight hour period would take a learning period of 3 days. We believe that 3 days is the minimum time in which any such operation can be brought up to normal speed. This is also true if a small group (3 or less operators) perform equally simple operations. Small groups accommodate themselves to each other very rapidly and do not have difficulty with group adjusting. We attempt to limit standard cycle time to 25 seconds per operator. The shorter cycle will require less learning time, because the operator completes more cycles per day and thus gets more practice.

With a larger group (4 or more operators) both simple and complex operations require an additional allowance for operators to adjust themselves to each other. Two days is a justified allowance for up to 15 operators learning to cooperate with each other under incentive conditions.

The company now has a comprehensive list of learning times for all such short run jobs in the plant. These can be used as benchmarks for comparison with new jobs.

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WHEN DOES IT PAY TO UPRATE MOTORS?

In this interview, L. T. Daley, who is responsible for engineering economic evaluation of repair and maintenance proposals for General Electric's Service Shops Department (Schenectady), explains how uprating could save you big money.

Exactly what do you mean by "uprating" a motor?

Essentially, it means increasing the power output capability of a motor by changing the windings. In the process, we may change other parameters of the motor such as in torque characteristics, running temperatures, even speed. But increased power is what we're after.

What's behind the growing interest in uprating motors?

Two reasons: Money and better insulation. It costs only a little over half as much to rewind a burned-out 300-hp. motor so it will develop 400 hp. as it does to buy a new 400-hp. motor. We couldn't make this power jump at any price, however, until the last few years when better insulating materials became available. I should clear up one point, though. Only a small percentage of rewinding jobs today involve increasing the rating. Actually, few plants are taking advantage of the money-saving opportunities offered through uprating motors.

What is the significance of better insulating materials?

The only working parts of a motor are the iron core and the copper (or aluminum) conductors. The more turns or cross-section of conductor we can pack into the slots in the core, the smaller a motor can be for a given horsepower; or conversely, the more horsepower we can get from a given size motor frame. The insulation does nothing but keep the conductors from contacting each other, the core, or adjacent objects.

Now, if insulation is weak or if we're not sure how it will stand up over long periods of time, we have to use more of it to be on the safe side. This "factor of ignorance" meant older motors had to be oversized to be dependable. Today we know lots more about what performance we can expect from insulation.

Big improvements have been made in all classes of insulation since most of the motors in the typical plant were purchased. New materials are thinner. (That means more working space for conductors, less for insulation.) They're tougher and denser (they stand up under abrasion moisture, contamination, and abuse). And they are better able to withstand short-term excessive temperatures. (That means windings don't have to be oversized just to carry starting or short-time overloads.) And we have totally new types of insulating systems, too, such as silicone rubber.

How about reviewing the difference between various classes of insulation?

Until a few years ago, we had essentially only two classes of insulation. Class A, made up of paper, cotton, fiber, and certain plastics. These gave satifactory life if operating temperatures did not exceed 40 C. rise over a 40 C. ambient temperature (the actual temperature limits are set by industry standards and vary according to the method of measuring them). And there was Class B, made up of inorganic materials such as glass, mica, or asbestos held together or filled with an organic binding substance or varnish. Class B materials are designed to give satisfactory life with a 65 C. rise above a 40 C. ambient.

In recent years we've seen increasing use of Class H insulation, usually inorganic materials with a silicone binder—or silicone rubber. Class H design allows a 120 C. rise over a 40 C. ambient.

Why can motors be uprated better now than they could years ago?

There are three important reasons. First, we've got better insulation; it's thinner, and many of the new materials conduct heat away from the conductor faster, and it doesn't deteriorate as much with age.

Second, we've got many new insulating materials that withstand higher temperatures indefinitely. This means we can either put more current through the same size windings without damaging the insulation, or we can carry the same current with smaller conductors.

Third, the two reasons above mean we can now really take advantage of a "loophole" that has always been present in motor design. This is the "wasted space" inevitable when a limited number of tools must serve as practically unlimted numbers of different motor ratings.

Out of all the different design combinations that use any given size frame, perhaps half of them utilize the available working space to the limit, while the other half end up with room to spare.

How does a typical uprating job differ from a straight rewind job.

When a motor is brought in for rewinding, the motor repair shop would probably replace the existing winding with conductors of the same cross section and with the same class of insulation. But because new Class A and B insulations are thinner, the "package" of conductors and insulation in each slot will be smaller. The extra space would likely be filled in with insulating material. In spite of this "unused" space the customer will be getting a better job, because today's insulations retain their original characteristics better than older materials did, especially under abuse.

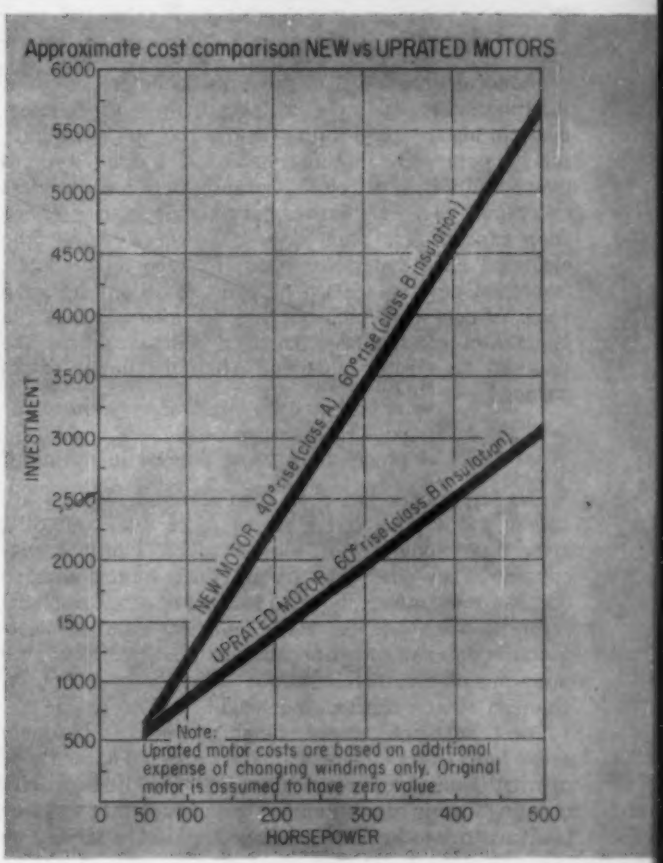
When a motor is to be uprated, however, the shop must redesign the winding. It must determine how much extra conductor can be fitted into the slots without bringing in some other undesirable characteristic. If the desired extra capacity can't be obtained by better slot space utilization, perhaps a different insulating system may have to be chosen—one that will operate at a higher temperature.

The reason uprating means redesign is that you can seldom get by with simply increasing conductor cross section. Finding the optimum conductor ampere-turn combination (while making sure that no other machine characteristic is jeopardized) calls for some competent engineering.

What rough guide can a plant use to determine whether a motor can be uprated?

In general, motors made before about 1952 will have more slot space available. The real old clunkers, however, have other handicaps like excessive noise, weight, size, or high-loss type iron laminations that limit the gain you can get. With variations between manufacturers, type of enclosure, and ratings, motors made between

"When a motor is to be uprated, the shop must redesign the winding . . . and determine how much conductor can be fitted into the slots without bringing in unwanted characteristics. A different insulating system may have to be chosen."



"Actually, few plants are taking advantage of the opportunity to save money through uprating motors. Only a small percentage of motor rewinding jobs today involve increasing the horsepower rating."

about 1920 and 1950 will offer more opportunity for economical uprating than those made before or after. And motors made in the last two or three years, especially in higher speed ratings below 200 hp., don't offer much opportunity for uprating at all. I don't want to oversimplify this, of course, because there are countless exceptions. The real answer has to come from a service shop expert. If a plant does it's own rewinding, the electrical shop supervisor needs to keep up on latest insulation developments if he plans to do any uprating work, of course. Watch out, too, for motors where the lamination iron has been damaged. Any weakness like this will be greatly magnified when the motor works harder.

What kinds of plants show most interest in uprating?

Our experience has been that uprating requests are coming from users trying to get more work out of a given pump, compressor, tool, or piece of process machinery. They don't want to buy a new motor, perhaps because of the money, but also because of other problems resulting when a larger motor must be installed—new mounting dimensions, restricted maintenance space, the necessity of changes in motor spare parts inventory, changed shaft diameter and height, and so on.

Most machine output capability increases sought are in the 5 to 40% category and correspond to the range of what is possible through uprating. Few users specify uprating for burned out motors going back into replacement motor stock, although they might save money by doing so, whenever they might have use for this increased output.

How can a user be sure he'll get the added capacity he expects from an uprated motor?

That particular problem is one of the toughest obstacles to overcome. Calculating the exact amount of added capacity calls for engineering skill. Most repair shops have to rely on help from motor designers either in their own company (if they're a captive or franchised service shop organization) or from the original motor manufacturer's engineering department.

Even with the best of help, however, it's difficult to predict rated output or operating temperatures to a high degree of accuracy.

If you really want to know the true horsepower rating of a rebuilt motor, you have to measure the output with a dynamometer or with some known load. And you have to hold the load steady until the motor reaches stable operating temperature. This can be approximated in your own plant if the load is, say, a pump or compressor for which you have accurate performance curves and efficiency hasn't changed.

But the equipment investment and the work involved in dynamometer testing almost rules out actual load tests on all but small high-speed motors. Few shops can afford to even think of testing say a 250 hp. low speed motor. Even at the manufacturer's plant an authentic load test and heat run may add 15% to the market price of the motor.

How can a user know that he's actually getting the horsepower he needs?

You have to rely on the ability of your service shop in the final analysis. In some cases they would be willing to guarantee performance, but in many you may not always find them willing to guarantee temperature rise limits when you specify major increases in horsepower output.

On any drive, the real question is how well it handles the load without exceeding temperatures that will give an insulation life that is unacceptably short. When a service shop is in doubt about the ultimate load temperature of an uprated motor, they generally play it safe by turning to higher temperature insulating materials.

Why not play it safe and do all uprating with high temperature insulations?

High temperature coil structures such as glass fiber and/or silicone combinations may cost twice as much as a lower class insulation. Class H systems offer mechanical problems in winding because the usual silicone and glass insulation have less mechanical strength than most Class B materials. When operating temperature of a motor is raised too high new problems come up. Connections have to be brazed instead of soldered, special lubricants are required. The motor may run too hot for adjacent equipment. In fact, it just isn't practical to try to convert many motors to full Class H operation. It does, of course, make sense to use higher temperature materials if there is any question whether less expensive construction will be adequate.

"It's sweatshop conditions in foreign plants that enable them to undersell American-made goods."

Foreign competition isn't just a bad dream. It won't go away when foreign labor insists on and gets better working conditions. And costs aren't likely to overtake productivity to bring the price of foreign goods up to our levels.

A FACTORY survey of personnel practices in West Germany, Great Britain, France, Italy, and Japan gave the lie to popular misconceptions. Sweatshops are the exception rather than the rule. These sixteen postwar years have been ones of enlightenment, not only technologically, but also in the treatment of personnel.

Often, as members of a welfare state, foreign workers are provided with cradle-to-the-grave care in varying degrees. Industry-wide collective bargaining agreements make life a little sweeter by adding more frills to government-sponsored benefits. And major enterprises are bidding for services with attractive extra benefits in countries suffering from severe shortages of skilled labor.

Employers pay up to 60% above their basic payrolls into government funds for these benefits and untold sums for company-sponsored services and facilities. Yet foreign goods are competitive and often priced lower than ours on world markets.

The answer is take-home pay. It's about half what the average American worker gets. Despite this, the foreign worker covered in this survey (the worker you're competing against) maintains a living standard envied by many other non-Americans. So he isn't liable to bite the hand that feeds him. He is willing to settle for less in collective bargaining to keep his employer competitive. Government restraints also keep wage demands in line. And a traditional, deep-rooted fear of unemployment serves to temper his demands even more. Large labor reserves flow from agriculture each year. Now absorbed by the expanding industrial economy, they *could* spell unemployment in case of recession.

The next ten pages review the compensation a "poor" foreign worker gets for his labor. Our photos show the foreign counterparts of our own blue-chip giants, but these are the kinds of companies that establish precedents for all to follow.

NOTE—This special report was compiled by FACTORY Assistant Editor Vivian Lunardi who recently visited and interviewed managers in a number of West European plants. Additional material was supplied by McGraw-Hill World News Bureaus in Tokyo, Milan, Bonn, Paris, and Rome.—ED.

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Collective bargaining gains sweeten the liberal

FRINGE BENEFITS

Paid holidays

According to law, only one paid holiday (May 1) is required. Many companies give an additional 8. Simca and Compagnie Generale de Telegraphie Sans Fil (CSF) grant 9 days.

Paid vacations

Law provides 3 week vacation for all workers. Simca shuts down for whole month of August. Extra week is made up by working some Saturdays in the Spring. CSF shuts down for legal 3 weeks, but monthly salaried employees get extra days for seniority.

Family allowance

Part of government sponsored social security plan. Cash payments go to worker after second child. Other benefits include allowances for prenatal care, maternity and for housing where families with children have limited means. Employer pays premium.

Sick leave

Besides partial reimbursement for lost pay, worker and family are reimbursed in part for medical expenses. Simca: Hourly workers get only government insurance coverage. Special group of "commissioned" workers with high ratings, and monthly salaried employees get 45 days paid at full salary and 30 days at 75%. About half of hourly workers fall into this "commissioned" category.
CSF: Monthly salaried employees are covered by same provisions as at Simca. For hourly workers, company pays full wages for 45 days, 80% for next 30 days.

Workmen's Compensation

For accidents caused on job, or while worker is going to and from work, there is scale of daily allowances on basis of wages and degree of incapacity. Employer is sole contributor of premiums.

PAY PRACTICES

Work week

It's 40 hours, but overtime is common. Unions want overtime wages to be included in 40-hour work week. This would mean a 25% across board pay increase.

Shift differential

At Simca, the night shift (5:30 pm to 3 am) gets 15% more than day workers up to 40 hours. After 40 hours, night workers get time and one-half.

Training program

Labor laws require that companies contribute to apprentice fund. Instead, Simca established own schools in every division. Boys between 12 and 14 are offered 3 years of theory and on-the-job training, are then awarded certificate of skill in metalworking industry. Boys 15 to 16 with more technical training go to school for 4 years. They get a degree higher than skilled, but lower than engineers and technicians. Apprentices are not required to remain with company after completion of program.

Average monthly wage*

Law sets minimum wage at 33¢ per hour, but real wages are much higher. Less than ½ million earn the basic minimum.

At Simca:		At CSF:	
Unskilled	$122-$142	Unskilled	$90-107
Machinist	182-243	Skilled	107-130
Foreman	283-363	Highly skilled	130-203
		Foremen	over $252

* Not including various bonuses, but about 27 to 32 hours overtime monthly.

Wage incentive

At Simca there are daily production quotas. As inducement to raising productivity, company gives bonus of 4% of monthly wage to workers.

SERVICES & FACILITIES

Cafeteria

Simca has self-service cafeteria that offers hot meal of appetizer, meat, vegetables, dessert and beverage (wine, beer, mineral water) and coffee for under 45¢. Due to number of Moslem colonists working at plant, cafeteria caters to their preference for lamb and rice. Company subsidizes up to 50% of expenses.

CSF has subsidized cafeteria offering hot meal for 33¢. Wine and coffee are extra. Company gives sum representing 2.25% of total salaries to committee for running cafeteria. Where plants are close to workers' homes, personnel go home for lunch. In other plants about 90% of the workers eat in cafeterias.

Washing Facilities

Both Simca and CSF provide clean modern wash-room and shower facilities. Lockers for work clothes are also available at Simca.

Sports Program

Teams organized on plant level are popular, but worker's don't play on company time. Simca subsidizes program and buys equipment to the tune of $50,000 yearly.

Picnics & outings

Simca does not sponsor this kind of activity because response is less than lukewarm. CSF leaves it up to each plant to organize such diversion.

Company Loans

Simca runs welfare service to take care of family problems. Lends worker money without interest for various needs including the purchase of apartment or house. CSF workers can get loans (up to 2 months' wages) in exceptional cases by applying to head of personnel section. These are paid back over one year period.

Progressive companies improve

Snowballing contract gains and company concessions are multiplying the rights and benefits French workers get under law. Bonuses, premiums and wage supplements boost take-home pay far above the basic wage. Besides, many agreements grant supplementary unemployment and old-age benefits which nearly double government payments. Contracts provide longer vacation pay for seniority, time off with pay for marriage or death in family, for union activities, over two hours off daily with pay to look for job after layoff, seniority bonuses, and time off for attending trade schools. These fringes can cost the employer as much as 50% over payrolls.

As in most Western European countries, there is a definite shortage of high skills. Laws hamper importing help from other countries, so companies like Simca hire foreign workers already in the country. About 10% of its workers are French colonials from North Africa.

Automation, progressing slowly, poses few morale problems. A worker displaced by a machine is usually trained to run the machine. This automatically jumps him into the next pay category.

The three principal labor unions are Catholic, Socialist, and Communist. Latter group claims the most members. Strikes are usually short. Wildcats at plant level may last a couple of hours, while industry-wide strikes seldom go over a day or two.

Modern methods and a clean plant make Simca a good place to work.

government benefits in France

Pension plan

Employees reaching 60 years who have been paying 30 years are eligible for full pension; for 15 years, partial pension. Contributions are paid by employer and employee. Simca has its own plan for which it pays all premiums. Worker retiring at 65 years after 25 years employment gets 37.5% of average salary during last 3 years. CSF plan pays all premiums for monthly salaried employees with company before 1958, and for hourly workers before 1950. For rest, company pays 60% of premiums and employee 40%. Both plans supplement government one.

Unemployment insurance

Required by law that both employer and employee contribute premiums to fund, with former paying much larger share.

Medical and hospital plan

Company-sponsored voluntary plan costs subscribing worker $1.75 month premium. It pays 20% of costs for medicines, doctor visits, hospitalization, etc., which added to 80% contribution from government insurance, provides worker with complete medical-hospital coverage. About half the personnel at Simca and CSF belong to this plan.

Life insurance

Beneficiaries of deceased worker receive lump sum equal to 3 months wages. Simca: Company pays full cost of private plan. Widows of workers with company over one year get one year's salary plus bonuses and 25% additional for each minor child up to 4. CSF: Has private insurance plan only for foremen and management staff. But in case of death or total incapacity caused by accident, company pays 12 months' wages to worker or widow.

Raises

Salaries are reviewed once yearly at CSF and twice yearly at Simca. Increases are given only on merit. In addition, government escalator clause ties cost of living to minimum wage rate.

Suggestion systems

At Simca workers and all lines of management are encouraged to make suggestions on special forms. These are numbered and worker tears off numbered receipt. Workers whose suggestions are accepted have numbers printed in employee publication. Reward is percentage of total savings in year.

Overtime

From 40 to 48 hours, over time is 1¼; 48 up to legal maximum of 60 hours, overtime is 1½. Double time is paid for Sundays and holidays. Union contracts often provide 30 to 35% premium for overtime up to 48 hours.

Bonus

At Simca, contract provides quarterly and seniority bonuses for monthly salaried workers. Quarterly bonus is 10% after 6 months, 27% after 1 year, and 30% for two years. Seniority bonus paid after 5 years with company is 1% of basic monthly salary. No deductions except tax are made from bonus which is handed out in special envelopes and in cash. At CSF, seniority bonus is 10% after 10 years for engineers, 3% after 3 years for monthly salaried employees (up to 15% after 15 years), and 7½% for hourly workers after 3 years. Bonus is also paid when company has good year. Last year, engineers and monthly salaried employees received 9% of one month's salary; hourly workers, sums ranged from $60 to $95.

House Organ

Simca publishes tabloid size 24-page paper with 35,000 circulation. In it appear articles of general interest as one would find in consumer pictorial magazines, as well as items on safety in plant, news of employees, results of worker suggestions, women's fashions, recipes and cartoons. Both the middle management and engineers receive a bi-monthly information bulletin. CSF publishes quarterly 44-page magazine with technical, travel, and general appeal articles as well as stories on departments in plant and on company product applications.

Housing

Near plant in Poissy, Simca has built housing projects for some of its 17,000 employees. Garden type apartments have modern facilities, with stores nearby providing all needs.

Employee discounts

Simca allows 10% worker discount on its cars. Arrangement with suppliers offers personnel 10 to 20% off on radios, refrigerators, furniture, etc. CSF employees can get company products such as radios on discount. One plant runs cooperative store. In most other plants, shop committee has agreement with local purchasing group which sends around a truck with merchandise which employees purchase at discount.

Safety

Large plants assign safety to department or committee headed by chief officer or engineer. Safety shoes, clothing and glasses are provided by Simca and CSF. Extra pair for personal use are offered at greatly reduced price at Simca.

worker's lot — they wine, dine, and house him as never before

This modern apartment community, close to plant, exclusively houses workers and families at below-average rentals.

Cafeteria serves low-priced hot meals including wine. Specially-prepared lamb and rice dishes cater to Moslem workers.

No unemployed, so workers are imported to ease

FRINGE BENEFITS

Paid holidays
Average is 11 national and religious holidays. In Catholic Bavaria, there are two additional religious holidays, and in Protestant Hessia, one less.

Paid vacations
Law establishes minimum; each company sets its own policy. Krupp Steel combine gives minimum of 12 days, increasing according to longevity. Workers under 18 and those who are disabled get 50% more time than normal staff. At German Ford, minimum is 18 days. Most plants like Ford shut down. Others stagger vacations like Krupp.

Rest periods
Formal coffee break is verboten, but coffee and sandwiches can be consumed at work station without interrupting job. Those under 18 and women workers are granted a 15-minutes rest in afternoon.

Unemployment benefits
Compulsory state plan covers all personnel earning under $165 month. Premium shared equally by worker and employer is 1% of income. Now suspended due to pile-up of funds.

Pension plan
Compulsory state plan covers all employees earning up to $310 month. At retirement age (65 for both male and female) pension paid depends on number of years (minimum of 5 years) and amounts of contributions. Once pensioned, worker may continue earning up to 50% of pension. Premiums based on earnings are paid by employer (15%) and employee (7%). Company-sponsored plans are common. Retiree collects both state and private pensions.

PAY PRACTICES

Work week
It's 40 hours officially, but most work 45 hours.

Bonus
Hourly workers generally receive Christmas bonus consisting of sum set by management plus fixed percentage of wage earned by worker in one summer month, i.e., 35% of wage earned in July. Salaried employees usually get 13th month pay at Christmas, some get 14th month. Government workers also receive this type of bonus.

Overtime
Overtime abuses, where worker selected job according to how much overtime offered him, have been stopped by unions. Now employers must get union permission before workers can be paid more than a set number of overtime hours. Production backlogs a year or two ago were forcing companies to work much overtime. Backlogs persist, but delivery dates are extended. Overtime rate is time-and-a-third.

Shift differential
Most companies have 2 main day shifts with a shorter night shift. Average German does not like night shifts despite bonus of 75¢ per day.

Training program
Most companies train apprentices on the job. Large firms run elaborate schools with special teaching staff. In small companies, trainee is assigned to skilled worker. All apprentices attend free state-run and staffed training school each week for set number of hours. Companies have no control over schools, but do contribute free machinery and equipment to publicize themselves. First-year apprentice earns $22.5 month, 2nd year, $27.50; and 4th year, $38.75

SERVICES AND FACILITIES

Cafeteria
Over 60% of plants have cafeteria and dining facilities. Workers can heat their own lunch in steamers provided by company. Or, as is the growing trend, workers buy cafeteria meal at about half the restaurant price. To provide this service, company maintains food-buying staff and well-trained kitchen staff. Where no meal facilities exist, company contracts with local restaurants to serve workers.

Washing facilities
Over 80% of country's plants have latest improvements in showers and washing facilities. But at older plants such as the Krupp works, the facilities are very inadequate. Changing this is one of major points of company's program.

Sports program
About 50% of plants with over 250 workers sponsor such a program. Of these, some only donate towards equipment, while others provide playing fields, and completely equipped indoor pavillions.

Safety
Special staff people have charge of safety programs. Despite controls, accidents happen and the "ball of blame" flies between staff and workers. Injured disregard safety regulations, says staff; safety devices are inadequate, say victims. Most companies provide helmets, gloves, shoes, glasses, and clothing where required. Some pay part of cost of overalls worn only to protect from dirt and dust.

House organ
As common as sand on the seashore. Even small companies hire a full time editor who also doubles as public relations man. Features equal parts of employee news and company views on work safety, accident insurance, etc.

Workers receive many of our

There are relatively no unemployed (skilled or unskilled) in Western Germany today. Thriving industry, which has doubled the gross national product in a decade, has put to work over 20 million people and is shopping around for more. Italy, Spain, and Greece are expected to provide about 500,000 migrant workers this year.

Strikes, despite this labor shortage, have been few and short-lived. Companies with order backlogs think twice before bucking union demands. Most of the labor unions are under the control of a single, powerful governing body. Employer associations, which do the bargaining for companies, usually come to terms. Concessions have been in wage gains. From 1958 to 1960, real wages climbed about 9%. Productivity has kept pace with these gains, rising 80% within the last decade, and 8.4% in 1959. Besides higher wages, employers are paying about 44% above their payrolls in fringe and other benefits.

Automation is the magic at work here to keep the economy in balance. German manufacturers have drawn on American know-how and automated machinery to maintain production levels in face of labor shortages.

German workers today earn more, work less, yet still maintain purchasing power.

Female apprentice learning how to assemble electronic components at the Standard-Elektrik Lorenz plant in Tübingen.

"help wanted" cry in booming Germany

Sick leave

Both workers and staff personnel receive up to 6 weeks full pay for illness. Insurance fund pays percentage of salary and company adds balance. A 12-week leave for maternity is granted. Six weeks before birth, women may stay at home and employer is required to pay full salary in advance. Six weeks after birth, when she returns to work, employer pays remaining salary due her.

Child allowance

State-sponsored from funds collected through taxation. Each month worker receives $6 for second child and $10 for third child up to 18 years old. Allowance may be continued up to 25th year if child goes on to advanced schooling.

Medical and hospital plan

State-administered plan is compulsory for all personnel earning up to $165 month. Premium, shared equally by worker and employer, is 6 to 8% of wages. Provides free medicine, hospital and medical care. Legislation in progress may lift wage limit to $193, but when this is exceeded, employees who wish medical coverage must pay entire premium themselves. Many employees carry additional private health insurance.

Workmen's compensation

Strict state laws protect worker from portal-to-portal. Infringement by company imposes severe penalties. Contributions, paid only by employer, vary from area to area depending on degree of danger and work condition on job. Thirteen weeks after injury, worker is evaluated by medical board as to fitness for work. If 60% disabled, receives payment equal to 60% of 2/3 gross earnings. Total disability entitles worker to annual pension of 2/3 gross annual earnings up to 65th year after which retirement pension takes over.

Average wages*

	Men		Women
Technical and administrative	$209	month	$120
Skilled	80¢	hour	60¢
Semi-skilled	70¢	hour	52¢
Unskilled	60¢	hour	50¢

*After taxes in metalworking industry.

Raises

Hourly workers get wage increases only when unions negotiate new contracts. Workers who show promise often are taken out of rank and file and trained for better-paid jobs. Salaried employees are classified by category with maximum specified for each category. When that maximum is reached, employee must break into higher category to get wage increase. Most higher paid salaried employees get merit raises. Regular wage reviews are exceptional.

Salary—how paid

All employees are paid monthly and in cash. Large companies divide payments—hourly workers get wages at mid-month, salaried at end of month.

Suggestion systems

Suggestion systems are common among German workers. Most companies feel management personnel should, as part of the job, originate cost-cutting ideas, so no rewards are given them. Volkswagen has highly refined suggestion processing mechanism. About 420 worker suggestions were adopted in 1960 with rewards totaling $40,000. Average individual reward was $96, lowest $7.50, highest $1,375. Smaller firms have engineering department evaluate suggestions and management decides amount of payment.

Housing

Companies offer living quarters to entice workers in house-and-labor short Germany. All but large companies contract with local housing authorities and give financial help to contractors. In exchange, a certain percentage of homes are assigned to companies for use of employees. Large companies such as Krupp and Siemens finance and build housing projects for hourly and monthly paid personnel. Krupp owns 52,292 houses and apartments for its 110,000 staff.

Employee lounges

Available only in US-run firms or their subsidiaries. German workers must use well-equipped medical rooms to rest.

Employee discounts

Although many firms frown upon discounting, it is practiced to keep employees happy. Officially, discounts are allowed to production workers only, but non-productive workers buy and pay somewhat more for product. Some attempts are made to control number of units purchased. Generous companies, however, allow worker to buy two or even three TV sets annually. Discount arrangements with other companies are common and workers get wide variety of products at substantial savings. Retail discounts are widespread and most merchandise can be had at up to 25% off list.

Picnics and outings

Small companies organize bus, rail or boat trip and picnic annually for employees and management with all expenses paid. Large firms usually donate a fixed per-capita amount annually to departments to be spent on group activities. Department members often arrange to go on theater parties.

"extra" benefits plus better training to learn new skills

Tree grows through roof of modern Krupp hospital for employees in Essen.

"Auf wiedersehen" to these employees off to the annual company outing on streamlined bus.

New, well-lighted cafeteria for electronic workers.

Low unemployment and shortage of skilled labor

FRINGE BENEFITS

Paid holidays

Six in England, 5 in Scotland. Whit Sunday is not observed in Scotland.

Paid vacations

Two weeks for hourly workers. Usually required to take vacations during June, July or August. Office employees may take time as desired and may be granted more than 2 weeks depending on seniority. Government employees get up to 6 weeks. Simms Motor Units (London), maker of automotive and diesel parts, is typical. It gives 2 weeks to workers; an additional 3 days to weekly paid office staff and 3 weeks to staff paid monthly.

Rest periods

Most plants grant 10 minutes tea break in morning and afternoon. Simms gives 10 minutes in AM; 15 in PM. Management offered to install hot beverage vendors in plant, but workers rejected it.

Pension Plan

State plan levies about $1.20 weekly premium from both employee and employer. Some companies subscribe to private plans paying higher benefits.

Sick leave

Part of government administered national health plan. Hourly paid workers get percentage of pay from government fund for unlimited period; nothing from company. But weekly and monthly personnel receive fund payment and company makes up balance equal to normal wage for period that depends on length of service.

Simms offers hourly workers company plan to help pay difference between government allotment and normal wage. Office staff gets paid sick leave equal to one week for each year of service for period of 8 weeks.

PAY PRACTICES

Work week

Basic week is 42 hours for most plant workers. Anything over this is overtime. In metalworking industry, up to 30 hours overtime a month may be asked of the workers before it becomes optional and subject to negotiation.

Salary: how paid

Weekly workers, until 1960, had to be paid in cash. Now check is given if worker signs prepared document stating this preference. However, worker may withdraw his permission without notice to the harassment of company accounting departments. Office and administrative personnel are usually paid by check.

Suggestion system

Operates in many companies, but is being replaced by methods study, etc. Of little practical value because rewards are low—in many cases not over $15 per suggestion despite savings in thousands for company.

Training program

On-the-job apprentice is welcomed by most plants. He is encouraged to take course at local technical college to improve his skills. He is granted one day a week paid time off to attend. Some courses give apprentice 3 months on job and 3 months at school. Apprentices receive pay, but at reduced scale.

Average wages*

	Men	Women
Technical	$3100 Yr.	$2000 Yr.
Administrative not including VIPs	2500 "	1500 "
Clerical	1500 "	1000 "
Foremen	$48 Wk.	$30 Wk.
Skilled workers	40 "	25 "
Unskilled workers	28 "	18 "

* Represents rough average to show differential between job levels.

SERVICES & FACILITIES

Cafeteria

Government requires companies to provide eating facilities where food can be consumed away from contaminated work area. Most large companies run subsidized cafeterias or canteens and provide employee lounge. Small companies usually have lounge only.

Simms: Runs heavily subsidized cafeteria, no lounge.

Washing facilities

Government requires that hot and cold running water, towels and soap be provided. Where dirty working conditions prevail, company generally has showers.

Sports program

Employees organize company-sponsored "work teams" to compete in local leagues at cricket, football, hockey, darts, etc. Activities are run usually by club (membership voluntary) with funds provided by company and member dues. Clubs also arrange outings, dances and social occasions.

Simms: Club is supported partly by annual contribution by company, which also pays salary of full-time club secretary, but mostly from 7¢ week dues from members. Annual company-sponsored dance is free to employees.

Employee discounts

Generally given on company-made products having domestic appeal. Includes products made by divisions other than where employee works. Offered at cost or cost plus set percentage. Arrangements covering other companies' products are rare although several labor unions do offer this service to members. Company stores are rare and where they do exist, price concessions are unusual.

British go Americans one better

Automation is no national bugaboo in a country where unemployment is only 1.3% and skilled workers are at a premium. In fact, it's being accepted without resentment in most cases. Skilled workers, displaced by the machine, find new employers ready to snatch them up at the gate. A consequence of the shortage is a decline in apprentices. The unskilled are shunning apprentice training and subsequent low wages for the relatively high starting wages being offered elsewhere.

In this highly developed welfare state, British employers are spared the burden of government sponsored fringe benefits. The state pays most of the bill from general tax revenues, so the employer contributes only 3.3% above his basic payroll to these funds.

Labor unions represented about 50% of working men and 24% of women in 1959. Non-union companies are small for the most part, while large plants are rarely without union members. In shops with non-union members or few members, grievances are rarely settled collectively. But in union shops, grievance procedure involves twelve or more steps before failure to agree initiates strike action. Company is represented in negotiations by employer federation to which it belongs. Employers have no legal redress against strikers. An action cannot be brought against a union, although unions can bring suit against employers.

Apprentice applies classroom theory in the shop as his supervisor instructs him on operation of a milling machine.

lures automation in GREAT BRITAIN

Stock option plan

Few in operation, but it's catching on. Offered usually as annual bonus based on salary and length of service. Principal objection: About 50% of stock distributed to personnel is sold immediately.

Medical and hospital plan

Part of government administered national health plan. Weekly premiums paid by employer (8¢), male workers (38¢) and single women (29¢), cover all medical expenses including drugs. Large companies, in addition to this service, retain resident medical staffs for accidents and sudden illness.

Simms: Directors and senior executives subscribe to private plan providing private-patient treatment and faster attention. Also grants free annual check-up with well-known specialist.

Workmen's compensation

Government administered national insurance plan levies 18¢ weekly contribution from employee and company for injury, disability, unemployment, special hardships, hospital treatment for injury. And in case of death resulting from injury, dependents receive allowance. Company is liable for accidents on job, and rarely fails to pay. If company and injured fail to agree on sum, worker can bring civil action through union.

Simms: No agreed scale of compensation, but tries to agree privately whenever possible.

Life insurance

No government coverage. But company-financed pension arrangements usually include death benefits. Simms: Company pension plan includes life insurance.

Raises

Negotiated on national level by unions. Claims are made annually by unions and concessions usually made by management. Negotiated rates are minimums which are lower than most companies pay. Non-union shops usually follow patterns established by national awards. In addition, companies review worker wages regularly and give merit increases either to individuals, departments or sections.

Bonus

Companies commonly give annual bonuses based on length of service. Simms pays bonus at vacation time based on profits and length of service. Those with under 3 years get $30, 3 to 7 years, $45; and over 7 years, $60.

Wage incentive

Piecework is widely practiced, calculated on daily or weekly basis for individual or group payments. Simms gives individual bonuses for parts produced over standard allowance. With onset of automation, group bonuses to 20-30 workers are being introduced and figured according to basic rate. Interesting sidelight of group incentive: Less supervision needed—fellow workers keep slackers moving.

Layoffs

Few large scale layoffs in last few years. Where necessary, seniority is usually deciding factor. Layoffs planned in phases to avoid dumping too much labor on local market at one time. Skilled workers are snapped up quickly due to shortage.

Savings plan

Government administered plan pays fair rate of interest. Employees who subscribe have salary deductions at source deposited in individual account by the company. Simms: Government plan not popular with employees.

Housing projects

Company-owned housing is offered by only a few large firms as inducement to prospective employees. Most projects are jointly financed by companies and local authorities anxious to draw industry to district. Small firms are unable to offer housing.

Company gifts and loans

Companies rarely run credit unions on official basis. If one exists, it is run privately through sports and social club or by enterprising individuals who take percentage.

Simms gives wage advances in special circumstances which are repaid over prearranged period.

House organs

In common use, but as voice of management rather than chronicler of employee events.

Simms: Publishes a quarterly that gives the management point of view.

Safety

Government sets minimum safety standards for machinery guards, fencing, eye protection, hoist, cranes and lifting tackle inspection and design, stairs and handrails, precautions against falls, gassing, explosions, pressure vessels, and fires. Nearly all large and many small companies have safety program and full-time safety officer. Company provides glasses, clothing and safety shoes free of charge or at nominal cost.

Simms: Safety committee consists of management and workers. One sub-committee spot-checks departments periodically and reports to full committee. Second sub-committee investigates specific accidents and recommends ways to avoid them.

with highly developed apprentice training program

A lecture on engineering absorbs these apprentices who are enrolled in Rolls Royce, Ltd., five-year training program.

Arrows fly thick and fast at this after-hour interplant archery contest sponsored by company sports club.

Low base wage tells only half-truth on actual

FRINGE BENEFITS

Paid holidays
Thirteen religious and four national holidays.

Paid vacations
Minimum set by national union contracts is 12 days with 18 days as maximum. Small and medium sized plants usually have general shutdown, while large ones stagger vacations. Autovox gives hourly workers 12 days minimum and up to 18 days maximum for seniority. Staff employees get from 15 to 25 days for 18 years' service and 30 days for over 18 years. Plant closes down for 12 days. Additional vacation time is staggered from June to September.

Rest periods
Frowned on generally with penalties imposed for violations. Autovox, however, gives hourly workers a 10-minute coffee break in the morning and afternoon. Office staff gets only one 10-minute morning break, but works an additional 10 minutes at night to make it up. Cart with coffee and Coke circulates periodically.

Dependent allowance
Law requires company to include payment for family allowance in paycheck, but government agency reimburses company for all but about 30% of cost. Weekly payments to workers run about $1.60 for each child, $1.10 for wife and 50¢ for other dependent family members.

Unemployment insurance
Compulsory. Premiums p paid by employer and E on percentage of payroll. L off worker receives about daily plus 10¢ for each c for up to 180 days. If wor quits, he is entitled to o 30 days' payment. Not colle able in case of accident sickness.

PAY PRACTICES

Work week
Overtime is paid after 8 hours a day and 48 hours a week. It varies from 25 to 75% over straight time depending on whether overtime is day, night or holiday work.

Suggestion systems
With few exceptions, suggestions are not encouraged. If worker ventures to make good suggestion, line management takes the credit. An idea from a worker is usually belittled. Mistrust, resentment and lack of collaboration is natural result. Three Italian industrial giants—Olivetti, Fiat, and Montecatini—are the exceptions. They pattern their system on ours.

Training program
Apprentices, 14 to 20 years old, receive on-the-job and theoretical training in special schools for 5 years. They receive same fringe benefits as regular worker, but employers pay only 30¢ week to government for this coverage. Few companies have formal training programs. Workers with above-average ability may be singled out for more advanced training in some companies. Fiat and Olivetti, however, have highly developed formal programs. Most unique is Olivetti. Boys of 14 enroll in company school in Ivrea. For first 3 years, trainees study theory. This includes some background in the "arts" with readings from Marx, Engels, the French Revolution. For remaining 2 years, shop practice courses are added to theory. As students, boys are paid workers' wages.

Layoffs
Controlled by law. E ployer must prov good reason to uni If justified and wor is laid off, he recei compensation equal 2/3 of total wages 16 hours a week fr state fund financed employers.

SERVICES & FACILITIES

Cafeteria
Available in most companies. Serves low cost hot meals (from 25 to 40¢) or employees bring food. Fiat serves free cold drinks to steel mill workers in summer. Autovox has 45-minute lunch in two shifts to accommodate all in cafeteria facilities. Offers meat and vegetables or cheese and cold cuts and bread for 10¢, served by waiters at tables. Wine is brought by workers.

Sports program
Large companies sponsor sporting activities and supply equipment. Fiat and Olivetti have completely equipped sports centers. Fiat's covers 35,000 square meters for all activities from light athletics to swimming and tennis. This company's teams also participate in international meets. Autovox sponsors tennis and soccer teams which practice on plant site.

Housing
Only large companies such as Olivetti offer company-built housing to employees. Public projects for workers are community-built from funds contributed by employee and employer. In these modern apartments, rent is controlled and low.

Safety
All firms are required by law maintain safety committe Clothing and other safety eq ment is usually provided fr by company or at nominal pr Olivetti and Autovox claim l accident rates. Fiat accidents 1960 were 2.97 per thousa manhours.

Employers dangle tempting i

You need a scorecard to keep track of all the bonus and cash allowances that nearly double take-home pay for the Italian worker. Rather than raise basic wages when inflation started whittling buying power, the state instituted cost-of-living allowance and bonuses. The unions pushed further for production, seniority and year-end bonuses. Now big companies offer still more benefits to attract and keep their scarce skilled workers. This package of extras, plus fringe benefits, comes high for the employer. In contrast to welfare states such as Great Britain, the company pays the greater share of these costs—about 60 to 75% above their payrolls depending on industry and location.

Only large plants in Italy are sophisticated enough to be attracted by automation. Management at Autovox, a radio and electronics plant in Rome with about 1000 employees, seemed not at all concerned about automation. "Why invest in automated equipment when unskilled workers are plentiful at such low rates?"

Political affiliations determine a worker's union; companies hire workers from one or all three unions. When negotiations break down, issues are taken to court and judge rules on right to strike. His decision is final with *no further appeal* by either party.

Every two years unions and industrial representatives draw up new contract binding to all industry.

Suburbia, Italy, complete with the latest in ranch-type houses built for Olivetti & Co. workers in Ivrea.

Hot lunches for workers at the Montecatini Co. potassium sulphate plant in Sicily are prepared in this kitchen.

tual take-home pay in bonus-happy ITALY

Pension plan

Not compulsory, but most companies subscribe to government plan paid for by employer (2/3) and worker (1/3). Benefits are paid at 55 years for women, 65 for men as long as minimum of 180 months premium has been paid. Payments cannot be less than $155 annually or more than 80% of average wage during last 4 years of work.

Sick benefits

Government-sponsored and compulsory by law. Company pays entire premium. Worker and family get up to 180 days year free medical, surgical and hospital care plus medicines. Payments amount to 50% of daily wage starting with fourth day after illness up to five months. Women workers on maternity receive 80% of daily wage three months before and eight weeks after birth. Salaried employees receive full pay for up to six months for illness; thereafter 50% of salary up to a year.

Workmen's compensation

Protects worker portal-to-portal. Employer pays entire premium (compulsory) to government agency, based on job risk. In case of permanent disability, worker receives 2/3 of yearly salary plus small percentage for each child and wife. For accidental death of worker, beneficiaries receive 2/3 of yearly salary plus lump sum varying from $225 to $400. Temporary disability starts on fourth day after accident and pays 60% of daily wage for 90 days. Monthly payments cover children to 18 years.

Housing fund

Set up by government agency to provide workers with low-income houses. Premiums based on wages are 0.60% from worker and 1.20% from company. Government then makes additional contribution of 4.3% of total employer-employee payment. Workers have top priority for modern apartments in these state-built projects.

Raises

Law provides for industry-wide increases every two years. These collective raises are negiotiated with unions on national level. Merit raises at the discretion of management are possible once a year. At Autovox, merit increases suggested by foremen or department heads go to top management for decision.

Bonus

Christmas bonus to hourly workers, equal to 200 hours' pay, is provided in contract. Salaried staff receives 13th month salary. Many firms also give 14th and 15th month or lump sum at Easter or vacation time. In 1960, Olivetti personnel received $72 bonus at vacation time based on profits. Every 6 months, Fiat gives all personnel, except executives, bonus based on profits amounting to about 6% of total yearly pay. Cost-of-living allowance, based on government bureau figures in effect for 3 months, is compulsory.

Wage incentives

Incentives and production quotas are exceptions rather than rule. Olivetti has daily quota and gives prizes for meeting it. Over 1/3 of Fiat workers' daily earnings consist of production bonuses of various kinds. All personnel at Autovox get 5% over base pay as general incentive.

Average wages

Graduate engineers, professionals	$270—300	Month
Technicians, administrative personnel without degrees	175—216	"
Bookkeepers, accounting clerks	110—144	"
Skilled worker	.48— .94	Hour
Semi-skilled worker	.38— .84	"
Skilled laborer	.36— .79	"
Common laborer	.31— .72	"

Pay scale for women averages 10 to 15% less.

ployee discounts

ost companies offer own products at reduced tes; some even provide discounts on other prodts. Large companies run stores with price breaks om 10 to 30% for workers. Autovox gives 30% off company-made radios and refrigerators; disunt to be raised to 40% shortly. Only one of ch type product can be bought annually. Shop ore offers reduction on food, perfumes, linens, c.

Gifts and loans

Credit extension is rare. Fiat and Olivetti do allow workers to borrow under special circumstances. Autovox gives loans amounting to 1 month's pay without interest and payable over 8 to 12 month period. Christmas and Easter time means company gift parcels for Autovox personnel. Everyone receives package of cakes, cookies, sparkling wine and vermouth. For Epiphany, employees' children up to 10 years old are given sweets and toys by company. During summer, company offers these children (6 to 12 years) a free 15-day vacation at seashore or mountains under supervision of trained personnel.

Clean-up facilities

Wash basins and showers are available in most companies.

House organ

Large companies such as Olivetti and Fiat publish employee papers, but small firms such as Autovox do not.

pting inducements to keep highly skilled workers in their plants.

Working mothers need not worry about their youngsters who enjoy supervised play activities in this well-equipped Olivetti day nursery and school.

Women workers under 21 assemble electronic circuits in spotless area at Autovox.

Guaranteed jobs, increases based on experience

FRINGE BENEFITS

Paid holidays

Nine national holidays plus local festivals and company anniversaries. About 50% of companies close on May Day although it is not a legal holiday.

Paid vacations

Six days for first year and one day for each additional year up to 20 years. Labor contracts provide from 35 to 40 days a year, but workers seldom take the time off. Nissan Motor Co. shuts down for 8 days in August and all 8000 employees take vacations at once. Shutdown has reduced absenteeism in summer which is higher than usual. Company uses shutdown for maintenance check.

Sick leave

Part of general health insurance coverage administered by government from premiums paid equally by employer and employee. Benefits are collectible for 6 months (1½ years for tuberculosis) and amount to monthly payments based on 60% of worker's monthly wage. Coverage is compulsory for all employers with over 5 workers.

Unemployment benefits

Government administered and compulsory for firms with over 5 workers. Employers with less than 5 workers may apply to Labor Ministry for group coverage. Benefits, payable for 180 days in one year, are based on 60% of daily wage for the previous six months of employment. Employer and employee pay equal share of premium to government. Government assumes 1/3 of cost of benefits.

PAY PRACTICES

Work week

Forty-eight hour week, 8 hours a day. In 80% of large companies (over 1000 employees) work day is under 8 hours.

Salary: how paid

Paid monthly in general and law requires that it be in cash.

Overtime

Law limits overtime to 2 hours a day at time-and-a-quarter. Small firms have longer overtime and pay less than provided by law.

Shift differential

Two shifts daily; 3 in chemical plants at times. Workers alternate between night and day work. Night shifts get over 25% more pay.

Layoffs

Contracts provide 14 days notice and severance pay, but layoffs are rare in Japan due to permanent employment tradition.

Suggestion system

Workers are encouraged to make suggestions and some are rewarded even if ideas are not accepted. Some companies reward only when idea is workable. Rewards are set by management —range from 25¢ to $300 with average from $2.50 to $25.

Average wage*

Plant manager	$145	Foreman	8
Chief engineer	126	Skilled worker	5
Experienced eng.	110	Clerk	4
Chief technician	100	Typist	3
Technician	87	Apprentice	2
Administrative	72		

*Monthly, for men, (as of March, 1959), in firms with over 50 employees. In large companies, averages are higher. About 80% is straight wage, rest is "extras."

SERVICES & FACILITIES

Cafeteria

Big companies offer meals for about 30% less than commercial restaurants. Where no facilities exist, workers bring in lunch or go to local rice house. In small firms, workers live in owner's house and eat with family.

Clean-up facilities

Mostly inadequate. Workers use nearby public baths or go home.

Savings plan

Many companies conduct their own savings program for employees which offers higher interest rates than city banks. Credit unions and union banks are not widespread.

Picnics and outings

Once or twice annually, companies sponsor overnight trips for workers and families.

House organ

Employees publish monthly or bi-monthly in big companies, but management usually foots the bill.

Recreation rooms

Lounges are available in most big companies some of which also provide stadiums, gyms, tennis courts, and clubhouses. Hitachi, Ltd. offers 4000 employees (1/3 women) a modern clubhouse. Dues of 10¢ monthly entitles members to attend classes in painting, photography, flower arrangement, cooking, calligraphy, tea ceremony, dancing and singing, or to participate in 16 other sports activities. Company assumes all expenses not covered by dues. According to chief of general affairs section, the club has greatly improved employer-employee relations with a resulting increase in plant productivity.

Company-sponsored sports,

Guaranteed jobs in Japan are a tradition. Once on the payroll, employer and worker feel a moral obligation to continue employment "till death or retirement do us part." This immobility of labor, Japan's greatest industrial problem, is aggravating the shortage of skilled workers and professionals. A country long-accustomed to surplus labor and overproduction is finding it difficult to cope with the new, high-skill personnel demands. Higher bids for professional graduates are starting to erode this permanent employment system.

Another tradition that has Japan dragging its feet despite modern practices is the age-seniority wage system. An oriental reverence for antiquity judges work and bases promotions on experience and age rather than productivity. Merit increases are rare. A roadblock to younger employees with training in new technologies, this system shows signs of change.

Union structure is pyramid shaped. At the top are two national federations (right and left-wing) and below them smaller organizations formed according to trades. Finally, below them are the company-wide unions. Collective bargaining is carried out by executive members of national federations. The government Labor Ministry reconciles or arbitrates disputes. Interesting note: Union officials working full-time for the union in plants, are paid by company.

Low rent apartment for newlyweds of Yawata Iron & Steel Co. has all modern facilities including air conditioning.

and age hamstring paternalistic JAPAN

...est periods
...orkers take 10 15 minutes ...ice daily in ...ge companies; ...me companies ...nduct calis- ...enics during ...st for relaxa- ...on.

Medical and hospital insurance
Also part of general health insurance, and compulsory for all employers with over 5 workers. Provides total medical expenses for insured worker and 50% for family up to 3 years. Includes pre- and post-natal care and nursing care. Payments are based on 60% of monthly wage. Premiums are shared equally by worker and employer. Companies with over 1000 employees have their own health insurance unions. These are also government-managed. Over 90% of companies with over 30 workers are covered.

Workmen's compensation
Government fund protects workers from accidents or occupational disease. For accidental death, beneficiaries get 1000 days' wages. Disabled workers receive from 50 to 720 days' wages depending on degree of injury. It is also customary for management to give present of money to cover hospitalization and medical care. Funds to pay these benefits are collected from employer and added to by government.

Pension plan
A recent innovation now offered by 250 big companies. Premiums are paid by employer and workers, or by companies only. Retirees generally receive lump sum payments related to final salary. For example, employees in big companies receive about $1000 after 30 years' work. Small companies are aided by government subsidized mutual financing fund.

...raining program
...odeled after U.S. systems and introduced after war. Usually plant foremen ...e in charge of apprentices. Theoretical training is given for 1 to 2 weeks ...efore trainee starts working with actual machines. Trainee wages are ...ased on type of work and education. The higher the education, the smaller ...e difference between his wage and that of skilled worker. Difference may ...e as low as 5 to 9%, or as high as 50%. Retraining due to snail's pace of ...utomation is seldom a problem. Workers displaced by machines are usually ...trained by company or by government organization. Skilled craftsmen ...sent retraining because of additional schooling required, especially those ...o are old and close to retirement age.

Raises
Unions ask for raise once or twice yearly in spring and fall. Management and unions agree upon amount each time. In most big companies, there is an additional increment given annually based on workers' records. Individual merit increases are discouraged by union and tradition, which judges work on experience and age, not productivity.

Bonus
In large companies, up to 2 months' wages are given twice yearly in June and December. Smaller firms give less and often only once annually.

Wage incentives
Group incentives are in effect here based on productivity standard set daily. There is no such thing as a long-term production quota. If day's production is higher than standard set for that day, group, not individual, receives reward. Some plants have management and worker conferences to discuss improvements in methods.

...ousing
...mpany-owned projects for workers are rare. ...owever, Yawata Iron & Steel Co., largest steel ...oducer, has built apartments with modern ...cilities for 24% of personnel. Rentals are ...minal—about 30% less than average. Junior ...d senior high schools also have been built by ...mpany for children in projects.

Employee discounts
Company products and other goods are offered to workers at 10 to 20% discount only in big firms. Employees may also use hotels, inns, or other recreational facilities patronized by company at reduced prices.

Safety
Government regulations on safety and hygiene are strictly enforced. Inspector calls on plants often without notice. Plants organize safety and hygiene committees consisting of management men and foremen. Clothing, shoes and glasses are company furnished and generally used. Standards, however, are below those in most industrialized countries, especially in small companies.

Sports program
Very popular. Equipment is donated by large companies; employees share expenses in smaller ones. Inter-company rivalry sparks many matches of baseball, basketball, tennis, ping-pong and volley ball. Yawata Iron & Steel Co. provides 5000-capacity gym, also a swimming pool. Its employees have made outstanding records in sporting events, including Olympics.

recreation and fine arts keep work family together after hours.

Modern building houses company-operated general store where employees buy merchandise at 20% discount.

Swimming pool (and gym in background) where company athletes train to distinguish themselves in sports and Olympics.

Handsomely-furnished rest home, managed by the company, is free to employees and their families for recreation.

Folk dancing class, one of seventeen cultural and sixteen sports activities of the Hitachi, Ltd., employee club.

EQUIPMENT RENTAL

"We didn't go for all that baloney on investment, taxes, etc.," the material handling engineer at Rohm and Haas admits. "We wanted to save maintenance costs . . . and we have for the past three years. On an overall basis we have saved 10-15% on the 25 pieces of handling equipment we rent."

This comment is typical of the growing support for rental equipment in many plants. Not only is top management interested in the capital it frees for other use, but the operating manager is interested in adding an expert to his staff through renting. Both managers have discovered something new: profits are generated by efficient use of equipment, not necessarily by its ownership.

Spawned in the aftermath of World War II, capital equipment rental for plant operations received a big boost after the 1958 recession. Plant managers with short working capital were willing to expand production with "borrowed" equipment.

As the renting companies expanded too, plant operating men found other reasons for renting more equipment. High volume purchasing meant better rental rates. Well trained service men assured constantly operating equipment. Convenient service centers spelled quick emergency repairs, short downtime.

Renting capital equipment is old hat for many industries. General Shoe Company and IBM have built success on the principle. But it is only since 1950 that much attention has been paid to the advantages of renting all types of machinery. In 1954 Kearney & Trecker startled the machine tool industry with its plan for renting. In 1957 the Small Business Administration recognized its potentials with a pamphlet on the topic. By last year it had become big business; over $300 million of capital equipment was working in plants throughout the country, exclusive of the many leased cars traveling the rails. (ACF Industries, alone, reports over 17,000 special cars are leased by its shippers' Car Line division.)

One of the earliest companies to specialize in equipment rental was Lift Truck Rental Corporation of New York. Starting with lift trucks, tractors, powered hand trucks and similar equipment in 1950, they developed the degree of specialization which now typifies the mature renting company. In the last two years alone (as Clark Rental Corporation, a subsidiary of Clark Equipment Company) this group has written rental contracts in the northeast U. S. alone of $5 million. Support for its business comes as much from plant managers as from the company comptroller.

Overall reasons for using rental equipment are many. But for the operating man they boil down to three: improved maintenance, maximum use of equipment, and elimination of idle equipment.

"It's never been a case of lack of working capital for us. We felt we were getting cheaper maintenance," is what one conveyor plant manager told FACTORY. "We watch maintenance and repair costs per meter hour on our lift trucks. When they get out of range (over $1.25) we replace them . . . and this usually means renting."

Fortunately this plant keeps accurate records on all trucks, including maintenance by their own forces. This is the basis for any decision to rent. As the total number of trucks increased within the plant, they observed that rental downtime decreased below that of the shop maintained trucks. At present it stands at 6% for rental trucks, 10% for shop maintained trucks.

This emphasizes one of the operating advantages of rented trucks: less downtime—if the rental company has good maintenance. At the conveyor plant, the service man starts at 7 AM every day. (Plant starts at 8 AM.) He first checks the log book from evening shift, then may work one hour or all day fixing up trucks. He is responsible for keeping trucks ready to operate at all times.

At another plant, the service man spends 2½ hours three times a week at the plant doing preventive maintenance work or emergency repairs. Twice a week he steam cleans the trucks for easier maintenance.

WHAT SHOULD YOU EXPECT FROM REPUTABLE RENTERS?

The same services you would expect from any good specialist: realistic rates, equipment designed for your own operations, and top-notch serv-

L GROWS UP

SHOULD YOU RENT OR LEASE?

At least know the difference before you choose. From a legal and tax viewpoint there's little difference between a true lease and a rental contract. Both are tax deductible. The real difference comes in who does the maintenance.

In a rental contract, the renting company (lessor) takes care of all maintenance and servicing. As the lessee (the customer) you are free of all maintenance responsibilities.

In some cases, leasing may be required because no service on equipment is available. You maintain the equipment just as though you owned it.

But a word of warning: If you choose a lease with an option to buy, it may not be regarded as tax deductible. Internal Revenue Service may regard it as a disguised sales contract.

ice. A properly devised long term rental plan normally looks like this:

- All obligations pertaining to the equipment—maintenance, servicing, replacement, insurance, etc.—are assumed by the renting company.
- Emphasis is on utility of equipment, reduced downtime. This means a good program of maintenance, repair, and equipment replacement.
- Rates are established based on past experience, not on arbitrary competitive quotes. If the company finds that your utilization rate is higher than normal, the rate will be higher (2,500 hours/year is normal).
- A thorough survey of your present operations will be made by the renting company. This may suggest revisions in your present material handling systems that will improve basic operations.
- The best equipment for your needs will be provided. In some cases the renting company will buy your existing equipment at current fair market price. It may be replaced with new and better equipment or it may be rebuilt and rented back.
- The rental agreement will be written as a true rental plan from the viewpoint of Internal Revenue Department. Otherwise rental may not be allowed as a deductible expense item.

If the above is the kind of long-term rental plan you are considering, it isn't difficult to see where the renting company makes its money, and you receive your protection: on constantly running equipment. Every time a piece of rented equipment is not operating, it takes something from the lessor's profit. He must supply you with an operating alternate. This is the strong incentive that develops a top notch maintenance program, keeping your downtime at a minimum. It is also why the best equipment for your particular problem is recommended. Equipment not suitable breaks down sooner.

Most lift trucks are used 2000—2500 hours per year, the expected usage for truck rental. Overhauls are scheduled every 3500 hours and cost about $1200. Because replacements are provided during overhaul, you have no maintenance worries.

Truck renting companies have developed some of the best records on lift truck maintenance available and are substantiated by studies recently concluded by John Hopkins for the Army. Cost of maintenance reaches a peak in the third year. When a truck reaches 10,000—12,000 meter hours it is time to replace it. Thus, at the end of a normal 5-year rental contract both the customer and the renting company are ready for a new, improved model.

If your fleet of lift trucks is large enough, standby equipment may be kept in your plant and a resident mechanic may be furnished. A rule of thumb is a standby for every 10-15 trucks. In some critical areas, the ratio may be even smaller. Because the renting company guarantees 24-hour utility it will usually do whatever is most economical for both of you.

One of the largest material handling equipment dealers in Philadelphia has 33 mechanics on his payroll: 25% do nothing but scheduled preventive maintenance and emergencies on his 175 rented trucks. The others service 600 trucks on a contract maintenance basis.

When maintenance is handled by the lessor, internal maintenance forces can be reduced. One company experiencing this previously spent $23,000 per year maintaining 17 pieces of equipment, extending in age from 1 to 13 years. By renting 14 new trucks in place of the old ones (they were bought for their residual value of $20,000) the plant now has a single tax-deductible budget figure of $2496/month. The rented trucks are newer and better; all maintenance is done by the renting company; two men were eliminated from the plant maintenance force.

Rented trucks seem to make little difference to the men who operate them. They still retain a pride of "ownership," wiping them down and checking oil during the day. Two things help: assigning only one operator to each truck, and an every-other-week steam cleaning by the out-of-plant service man.

"Because the service man took such pride in taking good care of the trucks, our operators fell in line," reports the plant engineer.

Besides improved, and often cheaper maintenance, operating people find other benefits from renting material handling equipment. Space formerly used for truck maintenance

Cost projection under company ownership

COST OF EQUIPMENT

Include cost of equipment and accessories (new or leaseback), transportation charges, sales taxes, etc. (less residual at end of term). $_____

COST OF CAPITAL

This is to include all interest (or financing charges) on capital tied up in equipment . . . . $_____

MAINTENANCE COSTS

If you maintain a repair shop—
include all direct and indirect shop costs such as payroll costs, fringe benefits, rent, light, heat and power, depreciation of shop equipment, tools, insurance, record keeping, etc. Also include all outside repair service, tire replacement, purchases of parts, etc. . . . . $_____

If you do not have a repair shop—
include charges for outside service calls, parts, preventive maintenance, emergency calls, overhauls, tire replacement, painting, steam cleaning, etc. . . . . $_____

NOTE: All costs, compiled from your records for past years, should be adjusted to current price levels.

COST OF INSURANCE

This is to include both fire and theft . . . . . $_____

TAXES

This is to include personal property, excise, use, etc. . . . . $_____

OTHER OVERHEAD COSTS

Purchasing Department
This is to include time costs of interviewing salesmen, evaluating equipment, issuing purchase orders, record keeping, etc. . . . . $_____

NOTE: A recent survey by an independent research organization reveals that the average cost of processing and receiving orders for maintenance parts was found to be not less than $20.00 an order.

Receiving Department
This is to include costs of checking replacement parts received, preparing receiving reports, following up material, record keeping, etc. . . . . $_____

Stores Expense
Cost of receiving parts and supplies, stocking and issuing of parts, physical inventorying, record keeping, etc. . . . . $_____

Accounting Department
This is to include cost of checking invoices, posting of books, accounts payable, cost accounting, etc. . . . . $_____

Management Time
This is to include the cost of supervising the materials handling operation, the purchase of equipment, etc. . . . . $_____

LOSSES TO DOWNTIME

Include losses to idle personnel, production stoppages, shipping delays, costs of renting substitute equipment on short term, cost of owning and maintaining stand-by equipment, etc. $_____

NOTE: According to the results of a survey of representative industrial plants made by an independent research organization, the cost of unscheduled downtime ranged from a maximum of $1,770 per hour to a low of $1.50. The arithmetic average of all responses was $54.50 per hour. Omitting the highest figure of $1,770, the average was $16.28.

LOSSES TO RISING COSTS

To cover estimated increases in price levels for labor, parts and overhead . . . . . $_____

NOTE: Hourly labor rates for "All Manufacturing" according to the Bureau of Labor Statistics have increased at an average of better than 5% annually over the past several years. Similar rates of increases have been experienced for the cost of parts, supplies, fringe benefits and other overhead items.

OBSOLESCENCE

This is to cover both equipment and parts . . . $_____

NOTE: No provision need be made where complete fleet being replaced, and retiremnt contemplated within normal economic life of new equipment since obsolescence exposures will probably be normal. Where either all or part of existing equipment is to be continued in operation, efficiency thereof should be compared with equipment of current manufacture.

PROFITS LOST

This is to cover profits lost by capital tied up in equipment . . . . . $_____

NOTE: Additional profits to be earned, by investing funds freed by renting into the production of company product, can be determined as follows:

Funds tied up in equipment times annual turnover rates of capital times annual profit ratio equals extra profits to be earned.

OTHER COSTS

This is to include all other costs including lost manhours (caused by illness, training, etc.) losses to pilferage of parts and tools, etc. . . . $_____

Total projected cost of ownership . . . . . $_____

Projection of savings through rental

Total cost of renting

This amount to be supplied by your rental system representative after survey is completed. $_____

Savings by renting $_____

can be used for productive purposes. No spare parts need be carried. There is no loss from pilferage or obsolescence. (One plant surveyed by a renting company found $20,000 in obsolete parts for trucks no longer manufactured.)

Scheduling can be based on uninterrupted work, for, if the trucks break down, they will be replaced. Shipping backlogs and lost time of operators from inoperative lift trucks is eliminated. But a word of warning: Make sure the renting company has an adequate stock of replacement equipment.

One of the advantages of renting material handling equipment is in paying for only the minimum number of units needed for average production. Seasonal peaks or emergencies can be handled with short term rentals at special rates from your same lessor. This eliminates depreciation, insurance, storage, etc. for surplus equipment not used during slack periods.

Equipment rental also produces fringe benefits: more accurate budgeting of future costs, tax benefits (if contract is properly executed) improved employee morale, and a hedge against inflation.

HOW MUCH DOES IT COST?

Not as much as you think, when you look at all costs involved. But to find out whether renting costs are more or less than present materials handling expenses means a candid comparison and evaluation. These four steps are essential:

1. Determine the number of years you want to rent—usually based on the optimum economic life of equipment being considered.
2. Decide how many trucks will be retained, how many replaced from present truck fleet.
3. Study past costs for equipment. Use this as basis for projecting future costs of trucks under company ownership.
4. Compare final projected costs with arrangement offered by rental company.

To help you make an accurate analysis of present and projected costs, the form on the facing page is useful. It emphasizes you must include not only direct costs (depreciation, maintenance, interest, insurance, taxes, shop overhead, etc.), but also recognize the costs of downtime, obsolescence and other "hidden" items.

Another hint in making your comparison: Don't forget to adjust factors to current price levels; give full consideration to inflationary aspects of prices in the future. You are comparing what costs will be, not what they are today.

To obtain a rental quote for comparison with your own costs, contact a reputable company. One that knows its business will develop a contract price for your needs, but only after a thorough analysis of your plant's operation. They will look at your running hours of equipment, maintenance requirements, material flow efficiency, equipment needs, and optimum number of units needed for your operation. They might also submit suggestions for revising your material handling patterns that are worth listening to.

But the final decision is up to you.

WHY SOME PLANTS RENT

Blocklite Co. in Selma, Calif. needed additional space for curing and storing its concrete products. Each 8-hour day 125 tons were shuttled between producing area and restricted storage area. The solution was to go vertical. By turning in the old limited trucks and renting special lift trucks with triple-stage up-rights, the company now stores 33% more in the same area. It can concentrate on producing concrete blocks. The renting company worries about maintaining the trucks.

Trinity Bag & Paper Co. moved to a new plant in Elizabeth, N.J. To handle 225 tons of paper per day would require a fleet of 13 fork trucks—and an extra $75,000. Additional facilities maintenance and mechanics would be needed. By renting the equipment, these problems were exchanged for a fixed monthly rental. According to Plant Superintendent Ted Kelly, one of the best advantages of the new method of operating has been reduced production losses from less equipment downtime.

Piel Bros., Inc. of New York converted to pallets for handling their beer production. At the same time they investigated lift truck rental—and bought it. Now they have 41 pieces in two breweries and six warehouses in the NYC area. A resident mechanic (on the lessor's payroll) with a fully-equipped service truck is on duty every day handling lubrication, oil and LP-tank changes, and routine repairs and replacements. In plant stand-by equipment is available for emergencies, with no slack in pallet movement.

Whether you make carburetors, cardboard, or catalogs, the roadblocks to automation in your industry are being removed—perhaps faster than you think. Drag your feet and chances are competition will run you down. Fortunately, some guideposts have been set up by a number of successful industries. Here are tips culled by E. A. E. Rich of General Electric's Industrial Engineering Operation, Schenectady, N. Y.

RULES FOR AUTOMATING

Insist on top management support

Sooner or later, and the sooner the better, the decision to automate will have to be made by top management. The money and long term effort that must be committed is normally too great for decision at any other level, although the bulk of the work, inspiration, and decisions on actual systems will probably come from middle management staff levels. Once the goal is set by top management, employees at all levels will find it difficult to withhold their cooperation.

Think out your overall goals

Outline principal steps required from beginning to end, at least in block form. Details of this master plan can be filled in later. A well-thought out master plan will assure you that steps taken to automate one stage of your operation won't create new problems for other stages. And that process equipment purchased for early steps in automation won't have to be discarded later.

Develop a climate favorable to automation

Get the entire organization behind the effort. Automation invariably changes traditional boundaries of responsibilities. Unless all the key people are won over, you may encounter all kinds of reasons why methods can't be changed, and problems that can't be solved.

Pick the right men for the job

1. The men assigned to the project should have a clear understanding of the basic process requirements. They should be open minded rather than defenders of the status quo. And they should recognize that they may not reach the final goal for several years.
2. At least some of the staff will need to be good "communicators" capable of evaluating, selling (and absorbing) new ideas both inside your organization and outside.
3. The staff should, whenever feasible, take the lead in contacts with equipment suppliers. It must be able to put in writing complete performance specifications for system components in a way that leaves no room for misunderstanding.
4. Be sure you're automation staff works closely with other line and staff functions at every step toward automation. For instance your industrial relations people can keep you out of labor trouble and make sure that proper training courses are available when they're needed. Maintenance management can assure you that proper maintenance capability and equipment is there as soon as components are installed.
5. Automation team members should remain with the project until completion, whenever possible. Most projects are so complex that shifting of key personnel wastes time and money, and frustrates the staff.

Don't try changing the laws of nature

1. Staff men will have to learn that there are some types of problems that just can't be solved with automatic equipment at the present time. They'll have to learn to distinguish between a challenge and an impossibility.
2. It's important to recognize the limitations of components, particularly sensing devices like gas analyzers or sensitive gauges. Some of these absolutely demand frequent and proper maintenance. Many give satisfactory accuracy only over a limited range. If realities like these are ignored, the success of an entire project can be jeopardized.
3. At least one man on your team ought to spend some of his time looking for reasons why the planned systems just won't work. He can perform invaluable service by insisting that components purchased or built will operate satisfactorily under all foreseeable extremes of temperatures, contamination, moisture, and vibration; improper maintenance or even abuse; unreliable power supply; surges, voltage dips, etc.

Be realistic about equipment

1. Don't expect equipment suppliers to develop equipment that isn't absolutely necessary. Development costs on certain types of complex sensing devices and gauges may run from $100,000 to $1,000,000. And most of this money is spent on learning what not to do. This makes copying of successful sensors tempting to the supplier's competitors. And it has slowed the development of many needed sensing devices.
2. The supervisory computer control in any process control should be chosen with particular care. Computers use signal levels far below those in industrial control. Interference from poor connections or adjacent electrical circuits causes lots of headaches. A number of process automation failures can be traced to a misunderstanding of these limitations.

Don't neglect MASONRY DECAY

It's easy to walk right past telltale signs of masonry deterioration. But procrastination will cost you far more than prompt repairs.

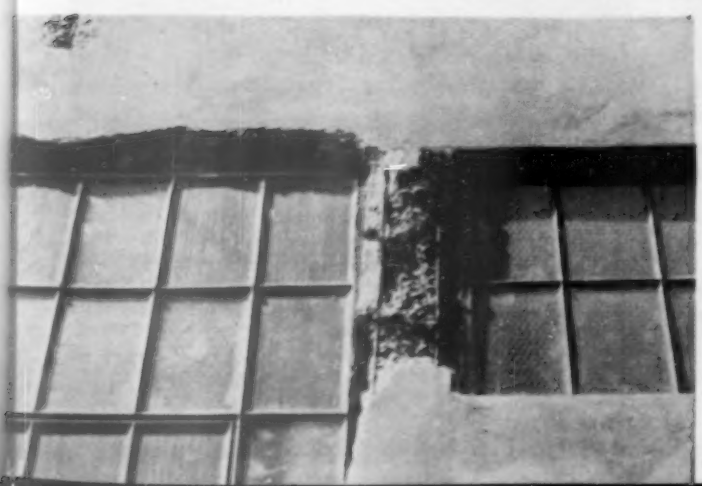
Is yours a plant that houses some or all of the functions in masonry buildings that are showing their age? How often have you hurried inside and pretended not to notice those exterior signs of decay that are beginning to appear? Danger signals like crumbling mortar, cracked caulking, spalled brick work, and rusty warped steel sash?

From the files of the Brisk Waterproofing Company (New York City) we've selected typical photographs for these three pages that show several types of deterioration of brick, block, and concrete structures. The pictures should serve as a warning to you *not* to neglect a periodic close examination of your masonry even if you privately feel that "those walls will stand forever." It's important to note that these pictures for the most part portray *symptoms* of trouble beneath he surface—trouble that is steadily and silently attacking the structure from within. You can handle masonry maintenance relatively cheaply if the trouble is caught in time. But costs will sky-rocket if you delay for long.

Here's an example: On one Brisk job recently, the client suffered a $5000 repair job plus $2500 damage to finished goods when water poured in through a leaky brick wall during an unusually heavy and driving rainstorm. "Yes, we had seen damp spots on the inside plaster during earlier storms, but hadn't paid much attention to them," admitted the plant manager. As an indication of what the repair job *might* have cost if it had been caught in time, a similar area elsewhere in the building was repaired for $450. The difference in costs here was that in the first case deterioration had progressed to a degree where substantial dismantling and rebuilding of the wall was necessary; in the second case, careful repointing of mortar sufficed.

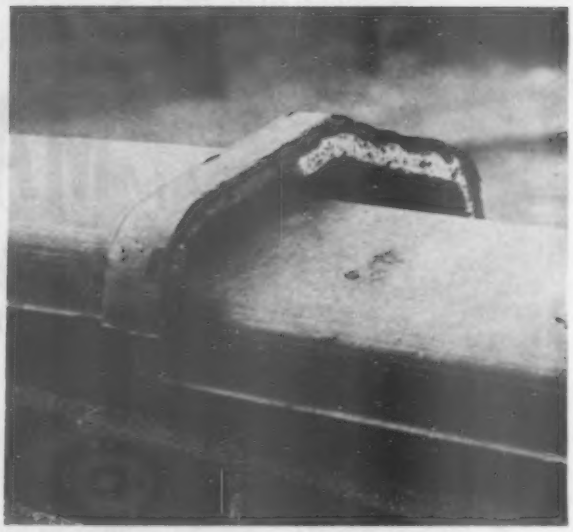
Turn the page

Do you have trouble like this? It's an advanced stage of concrete disintegration caused by water entering a "harmless" crack or defective calking around the sash. In either case, rusting and expansion of the hidden steel occurred, thereby forcing the surface concrete to "spall" off.

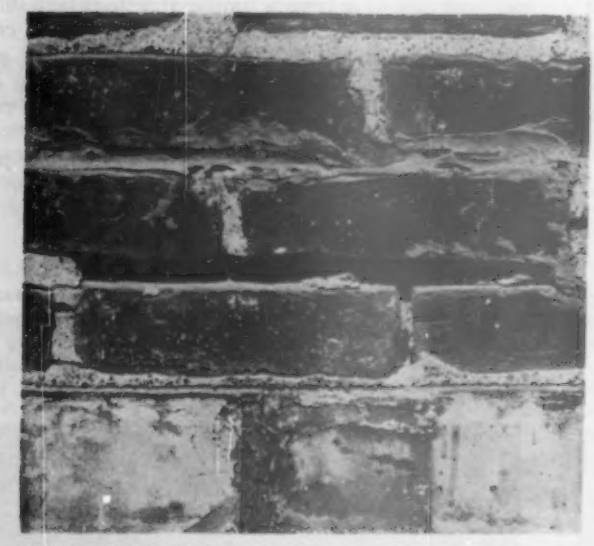


Skillful repairs require chipping away all the defective concrete, removing all rust from steel (lintels, beams, reinforcing, etc.), priming the steel, and replacing the bad concrete with new concrete able to prevent moisture from again reaching and attacking the hidden steel.

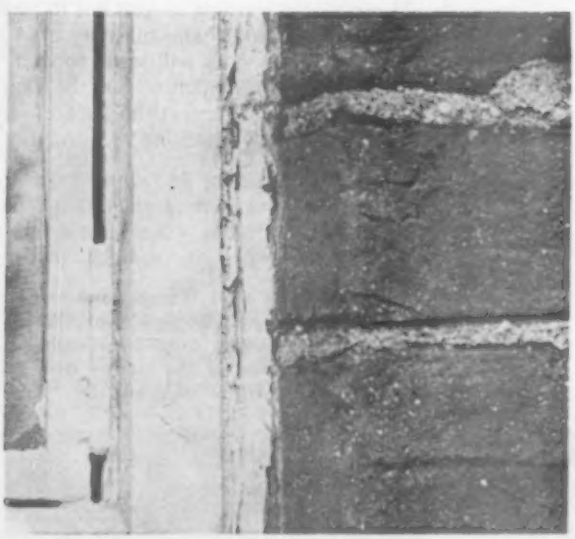
HEAVED ROOF DECK of masonry tile is frequently found on setbacks of older multi-story buildings. Patching with hot tar is just a temporary expedient. Proper solution is to remove tiles back to solid base, replace rotted deck, repair or replace weatherproof membrane, and replace the tiles. Typical cause is an inadequate number of expansion joints in the original construction. Once heaving has started, cracks admit water, then damage is accelerated in freezing weather.



LOOSE COPINGS on parapet walls spell trouble. If you have perimeter parapet walls or fire walls in your building, check them. Here, this loose coping could have been caused by movement of wall itself, or else water may have entered an open joint, followed by freezing and lifting of the tile. More trouble will develop as moisture progresses down through the wall. Remedy is to remove loose copings, re-seal the exposed top edge, and re-apply the protective copings.



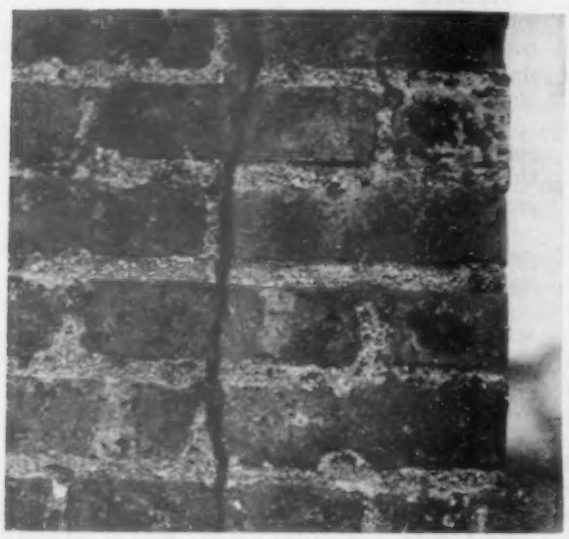
HOME-BREW REPAIRS can be deceptive. Here, a calking compound had been hastily smeared over open mortar joints. Even if the coverage had been adequate (it wasn't, as evidenced by the subsequent opening of joints below and beside the calking repair) the oil-based coating was too thin, and quickly dried out to leave new openings. The flashing in this photo appears to be in reasonable condition, but the mortar along the top edge of the flashing is a potential troublemaker.



CALKING DISINTEGRATION around a window can be expected from "conventional" oil-based calkings after 5 or 10 years. Their service life is governed by exposure conditions and by the skill and equipment of the original applicator. New types of calkings such as synthetic rubber based compounds are available on the market at costs several times that of conventional compounds, but their life expectancy ranges up to 50 years, when properly applied, according to laboratory tests.

TELLTALE CRACKS in brick and mortar arise from two chief sources of trouble: settling of the wall, or shrinkage of the mortar. If settling is the offender, take corrective action from the source of trouble and on up. Repoint all openings—even the hairline cracks—and replace cracked bricks where necessary. Any opening you can see can admit moisture. Chip out mortar to approximately ½ inch deep (or until solid mortar is reached), wet the cleaned surfaces, and repoint.

OPEN MORTAR JOINTS become progressively worse if not cared for, as evidenced by this extreme case of brick disintegration. So much water got into the wall and into the individual brick itself that the brick spalled; its face literally popped off during winter freezing. Remedy is to replace poor bricks and repoint joints to create an effective seal. Caution: it takes skill to remove hard and cracked mortar without damaging sound bricks, particularly if they're of a soft variety.



STRUCTURAL CRACKS indicate real trouble. This crack could have been caused by movement of the building, but more likely it was caused by water entering the masonry wall higher up. Then rust set in, attacking and expanding the hidden structural steel which is presumably behind this brick corner. Sometimes there is as much as ¾-in. of rust on a steel column. Long term cure: rebuilding this entire corner, including scraping and painting the structural steel.

DAMP SPOTS on interior walls are a clue to trouble outside. They indicate that a wall or roof has developed a leak big enough to admit and trap rain water. Damage can vary from simple lifting of paint and plaster as shown here, to water spillage on products and equipment, electrical trouble, and rotting of wood in roof deck or wall partitions. It's the steady effect of time and lack of attention that causes most masonry headaches, regardless of the excellence of the initial work.

The headline on this story is not quite right. We're already in a war. It's a new kind of war. One that could put controls and allocations on your operations without a shot ever being fired. In this exclusive story you'll find out what the President and his mobilization team have in store for U.S. plant men. —By LAWRENCE F. MIHLON, Associate Editor, FACTORY

...if

Quietly, almost secretly, a small group of White House advisors is wrestling with plans that could put your plant on a war footing—without a shot being fired in Berlin, or any other international hot spot.

If effected, the plans could freeze wages and prices and impose wartime allocations. Some consumer goods plants would move immediately to the production of military hardware. Vital manpower would be shifted from one plant to another to meet requirements.

Right now it's hard to say which of these emergency measures would be imposed first. Allocations are the most likely candidates. Modest allocation programs are already in effect. They have been since the start of the Korean War.

Even tougher to predict is the time when these controls will be imposed. It could be tomorrow. It might be happening right now. Then, too, it might not happen for some time. Why the uncertainty?

It's simply this. The President is not sure when the international situation will be serious enough to warrant such moves. And he's not sure yet how industry and the public will react to peacetime controls.

This much is certain. Key men in Washington are sold on the idea that we're in a "war" right now. They want the nation to recognize this fact. The old cold war idea is being junked.

Several of the men this reporter talked with expressed the belief that "Berlin-type" crises would be the rule rather than the exception during the next ten or 15 years. They said this is the rationale behind White House planning.

"Sooner or later the nation must face up to the seriousness of the situation," one official said. He indicated that modest peacetime controls would be designed to improve the psychological and mobilization preparedness of the industrial public.

The trigger for moving to controls will probably be something called "psychological inflation." That is, over-buying and hoarding caused by fear rather than shortages. This kind of thing, officials say, can happen often in a Berlin-type situation.

Any controls imposed now would serve to strengthen our international posture. They would show the Soviet Union that American industry is ready to stand its ground.

If industry works hard at effecting these plans, our mobilization lead time will be shortened considerably should a shooting war develop.

Shortening our mobilization lead time might be considered the objective of White House planning. It derives from a not too enviable record of World War II and Korea. After Pearl Harbor it took industry and Washington more than two years to marshal an effective industrial machine. After shooting started in Korea it took the nation something like a year and a half to get moving.

We cannot afford anywhere near that much time now, officials warn. Even if the first few days of fighting were limited to rifle fire, the bomb threat would be but a few minutes away.

Government mobilization experts want our industrial might going full steam within two or three weeks after the first shot is fired. At our present state of readiness we'd probably need about two and a half months.

When controls are imposed, chances are they'll be

f war comes

modest in scope. They won't appreciably affect our consumer economy. White House advisors are confident that the nation's plants have more than enough capacity to handle a sort of dual "missiles and motorboats" role.

If (shooting) war comes, the picture will change overnight. Industry and the public will be asked immediately to fall in behind the President in an all-out mobilization effort.

In a shooting war it's taken for granted that the public will accept controls without hesitation. In the absence of bullets, however, the White House is not so sure of popular acceptance. Right now the President lacks support for his plans on Capitol Hill. A mere handful of Congressmen are no more than casually informed on industrial mobilization problems.

There is a "watchdog" Joint Committee on Defense Production. It functions as a fact-finding group to report on mobilization progress, and advise on proposed legislation. Critics say the group has little genuine interest in industrial mobilization. They point to its membership, drawn from the House and Senate Banking Committees, as the reason for the apathy.

Thus if the administration were today to introduce legislation to give the President power to impose peacetime controls, experts are convinced it would fail to get by Congress. Lawmakers would bow to pressure from well-meaning citizens who oppose controls of any kind, at any time, short of all out war.

The President will probably go before the nation when his plans are ready. In a speech much like the "Reserves alert" of July 25, he'll set the stage and appeal for public support and understanding.

Then Mr. Kennedy's actions are expected to follow his emergency powers as set forth in Article Two, Section Two of the Constitution. (This passage establishes the President as commander-in-chief of the armed forces. But since the Civil War it has also emerged as the provision giving the chief executive power of "indirect sanctions." Truman used this hard-to-define emergency power in his try to seize the steel mills in 1952. FDR succeeded in applying more widespread controls because he felt they were "necessary to avert a disaster which would interfere with the winning of the war.")

Mr. Kennedy will declare a national emergency, impose certain controls, and go to Congress for legislation enabling him to keep these controls in effect for a specific amount of time.

The amount of time that peacetime controls might stay in effect depends on the international situation. Mobilization authorities indicate, however, that median time would probably be around six months from application of control to lifting.

"You can't turn these things on and off like water from a faucet," one official said.

The foundations for this new line of mobilization planning were laid in 1950. In that year the Korean War led to the passage of the Defense Production Act. The law provides for:

- A system for priority, allocation and requisition of strategic materials and facilities.
- Financial aid to expand production and supply.
- Price and wage stabilization.
- Federal settlement of labor disputes.
- Control of consumer and real estate credit.

. . . if war comes

Just how tough controls will get depends largely on how sophisticated a war becomes. If the shooting threatens to go beyond the rifle . . . you can expect the worst.

Congress suspended the wage, price, rent, and labor dispute sections in 1953. They can only be reinstated with Congressional approval.

In effect then, the basic state of emergency plan set up for Korea is still in effect today. However, the various agencies established then to control mobilization planning have been replaced. Then, there was the National Security Resources Board, and the National Production Authority.

Today, the coordinators of mobilization activity are the Business and Defense Services Administration of the Commerce Department, and the Office of Emergency Planning, recent successor to the Office of Civil and Defense Mobilization. This new office performs all the old OCDM functions except civil defense. It has moved over to the Department of Defense. OEP Director Frank B. Ellis reports directly to the President.

Other government agencies have emergency responsibilities, of course. But BDSA and OEP are set up especially to handle overall mobilization problems.

The specific mobilization activities of all segments of the population are contained in two secret government documents, Plan C for limited war and Plan D-1 for nuclear conflict. More general provisions of emergency activities are contained in the National Plan for Civil Defense and Defense Mobiliaztion.

Usually brushed aside as just another federal broadside, the National Plan contains the real story of the President's mobilization plans. Work on it was started some four years ago with the creation by former President Eisenhower of the Executive Office of Civil and Defense Mobilization. Though generally associated with shooting war, the document also sets up guidelines for controls and allocations in cases of serious international tension. Berlin is just such a case.

The plan defines limited war as any shooting conflict that does not strike the continental United States. General war puts an attack on our shores, with or without nuclear softening up.

In limited war the complete arsenal of direct (price, wages) and indirect (taxes, other monetary) controls would be imposed. General government action would resemble that taken in World War II and Korea. Specifics would be different. As in periods of serious international tension, the federal government would be the key coordinator of programs.

General war is another story. Plans are made on the assumption that a nuclear attack will result in automatic national bankruptcy. After survival, the first job will be to reinstate a solvent economic base. Though controls will be immediately effected, they will be administered by local and state authority. Naturally the controls will be complete and intense.

Because an extended limited war or a nuclear attack would seriously deplete our manpower pool, special and sweeping plans have been made in this area.

Manpower controls would include: priority hiring and requiring of certificates of availability, limitation of opportunity to priority activities, adjustments in hours of work, incentives for acceptance of high priority jobs. In addition, general war would call for these controls: Emergency registration of manpower by skill, age, physical fitness, and involuntary assignments of work.

These are the plans. They cover international tension, limited war and nuclear holocaust. The system is set up

so that specific provisions from each plan can be used interchangably to meet any situation.

What then is our state of readiness? If tensions burst tomorrow into the flame of limited war, what would happen to the men and materials that keep industry going?

The stockpile of strategic and critical materials stands at $7.5 billion, almost $3-billion over the stockpile objective. Generally we could stand a limited war for about three years before serious shortages would develop. Serious enough, that is, to start hurting the consumer economy.

Let's look at these vital areas.

- Machine tools—The government stockpile stands at 300,000 units, valued at $3-billion. A "trigger" program is already set up to begin immediate production hours after the first shot.
- Steel—General picture is very good. The industry has the capacity to handle a lot more demand. Trouble will come in special alloys and some structurals.
- Iron ore—Unlike 1950, we face no problem here. Sources are hemispheric. Quality is good.
- Rubber—Recent development of superior synthetics places us in especially good position here. A good thing, too, since our sources for natural rubber are in danger areas.
- Manganese—We have a large, quality stockpile. Experts figure we have at least a three year cushion to work on before supply grows critical.
- Chemicals—Post-Korean expansion of the industry puts us in better shape than ever. Immediate problems would develop, however, if war became super-sophisticated. Then controls would immediately apply to exotics like hydrazine and other rocket propellants.
- Utilities—Here too expansion has been great since Korea. Industry would have little to worry about for quite some time. Trouble might develop in petroleum sources if war extended to World War II proportions.
- Aluminum—Plenty of capacity and stockpile.
- Copper, lead and zinc—Though shortages might not come for some time, dislocations of sources would. And that's just as bad as a shortage.
- Tin—Real problems here almost immediately after hostilities start.
- Manpower—There's already a shortage of technicians and engineers. If military needs go over 3-million men, trouble will emerge fast. Officials urge plant men to start figuring manpower needs right now.

In total then, the picture looks pretty good for anything short of nuclear tragedy. It is that way because the Business and Defense Services Administration and OCDM are working hard. BDSA already administers allocations for some materials needed in defense production. BDSA men work behind the scenes a lot to settle distribution problems before they generate need for controls.

Why all this talk of controls then?

You've already heard the reasons presented at the beginning of this article. A comment from a key man on the President's mobilization team sums them up.

"Controls will come—not so much because we can't operate (efficiently) without them, but because public morale depends on them."

SHAKEOUT separates hot castings from sand molds. Foul air is carried off by overhead ducts.

WHAT! AIR-CONDITION A FOUNDRY?

Here is a step-by-step account of how one determined manager overcame obstacles that have kept the foundry a "hot box" for decades.

OVERHEAD DIFFUSERS bathe workers in a shower of cool air, which dissipates the heat of these steam test stations. Here, each valve casting is inspected.

Air conditioning has finally come to the foundry—that last bastion of industrial sweat and toil. Not unexpectedly, the installation has reduced shutdown time, increased production, and greatly improved employee morale and efficiency.

Behind this affront to tradition is John S. Leslie, president of Leslie Company, Lyndhurst, N.J. The company makes regulators and controls for industrial power systems.

"Because of the nature of the work," Leslie asserts boldly, "the foundry should be the first place to be air conditioned."

Leslie is well aware of the obstacles that prevent other plant men from making that same statement:

- Foundries are hot and humid in the summer. And they're usually cold and damp in the winter.
- Large quantities of outside air must circulate constantly to dissipate the steam, smoke and fumes which build up and make working conditions virtually unbearable.
- Rapid changes in outside air can change moisture content of process sand. Result: stalled production, summer *or* winter.

But, John Leslie was familiar with the benefits of in-plant air conditioning. The plant already had 90,000 square feet of air-conditioned space. It ranges in size from the 20,120 square foot office to a 550 square foot steam test station (facing page).

More importantly perhaps, the 6,900 square foot foundry is a pivotal cog in the company's manufacturing operations. In it, 39 employees make patterns and cores, mold, pour and clean castings for pressure vessels capable of maintaining a high degree of non-porosity. The foundry is one of the few in the country making castings capable of withstanding steam pressures of 600 psi and water pressures of 1000 psi.

Because of the foundry's importance, and a belief that it would improve efficiency, John Leslie rejected advice against air conditioning. He asked Carrier Air Conditioning Company (whose equipment is used elsewhere in the plant) to help develop a system for the foundry. At the start cost was not to be an influencing factor.

After considerable study, an installation contract was awarded. It went to the C. W. Fricke Company, a local Carrier dealer. The job took just about one year. It cost slightly less than the $75,000 estimated.

Engineers faced formidable design problems. They had to:

- Remove the high heat loads created in the manufacturing process.
- Prevent air currents from affecting the cooling of castings.
- Maintain satisfactory temperature and humidity levels—summer and winter.
- Prevent radical temperature changes on workers moving between spot cooling at work stations and the rest of the foundry. (Installation of a central system was ruled out as economically impossible, despite Leslie's request to ignore cost.)

To handle these problems this system was designed. It locates 36 low-velocity air outlets close to the floor in the main foundry building. In the shakeout and cleaning room, (left) 20 outlets are located on the side of an overhead duct. Seven ceiling diffusers are located in other adjacent foundry areas.

Twelve large volume blowers at the work level force contaminated air out through exhausts located in the roof. This way, all gases and fumes are carried off, maintaining a constantly fresh atmosphere on the work floor. Since conditioned air is not recirculated, filter cleaning is minimized.

In addition to the baseboard-level introduction of conditioned air, two other innovations were incorporated into the distribution system.

1. The two-story foundry is a rectangular building with a pitched roof. Against the two longest walls is a heavy wooden frame. It supports two overhead cranes (of one and two tons capacity) and extends almost the length of the structure. The frame made it impractical to feed conditioned air down from above the crane. The vertical supports holding the crane's track prevented installation of ducts along the walls.

A special platform in one corner of the building, just under the roof, holds a built-up air treating unit with a capacity of 30,000 cfm. From this unit, two supply ducts were wrapped around the outside of the building. From these, take-off branches pierce the building just beneath the crane track and extend down almost to the floor.

2. Some of the air ducts end very close to employee work stations. To eliminate annoying blasts of air, three separate openings of two different sizes were made in the end of the duct. This "split fan" effect gently diffuses the required air volume into the main foundry area. Directional louvers are installed in the two largest openings nearest the floor. This permits workers to receive a mild flow of air without being in the main stream.

The large volume of air entering at the work level maintains enough pressure inside the foundry to prevent outside air from entering. This action maintains the desired temperature and humidity levels, and eliminates drafts which would annoy employees and upset the cooling process on castings. Design conditions provide for a room temperature of 77 F. dry bulb and 60 per cent relative humidity. Outside air stands at 95 F. dry bulb and 75 F. wet bulb.

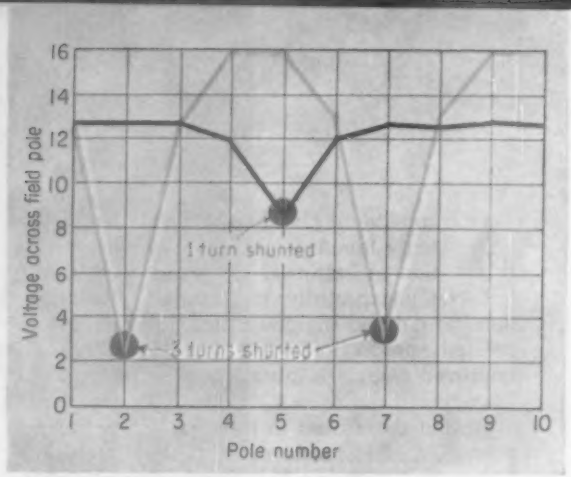
To maintain conditions with all outside air, the central air handling unit is equipped with both preheat and reheat coils using plant steam. Cooling is supplied by 200 gpm of well water at 56 F. pumped to an eight-row cooling and dehumidifying coil of 100 tons capacity.

Results of air conditioning the foundry have been "gratifying," to John Leslie. Seasonal extremes in temperature—a cause of increased absenteeism and foundry shut down—are past history.

Moisture control in sand used in molding is no longer a problem. Previously the sand either dried out too quickly or not at all. With air conditioning, a uniform moisture evaporation rate has been established. This lets the company make quality castings with a substantial reduction in rejects.

How to detect HIDDEN FAULTS in synchronous motors

By E. A. PETRUCCI District Engineer
Mutual Boiler and Machinery Company Atlanta, Ga.



PREVENTIVE MAINTENANCE testing showed up these voltage drop readings for the poles on two 720 rpm synchronous motors. Voltage applied was 125 volts. Voltage across adjacent poles is affected by short-circuited turns on one pole.

Synchronous motors sometimes seem to last forever. It's not unusual to find one making its first trip to the repair shop after 30 years of uninterrupted operation. But there are plenty of exceptions. In fact, average synchronous motor service between major repairs is perhaps closer to half this figure.

Because most synchronous motors also correct low plant power factor, they are preferred for base load drives (central compressors, water pumps, air conditioners, boiler auxiliaries.) As a result, unforeseen failures create serious problems, frequently shutting down or cutting production while the motor is repaired or replaced.

Failure of either stator or rotor (field) windings can shut down a synchronous motor. Stator winding failure puts a machine out of service immediately. Field winding failure is usually a progressive deterioration. Preventive maintenance testing of stator windings is limited to (1) plotting successive megohmeter readings over a period of time and watching for any sharp increases or (2) to the relatively newer methods of d-c overpotential testing (DCOP) being used by some plants (FACTORY p. 67, February, 1960).

Rotor windings that fail usually do so because short circuits develop between adjacent turns. Field insulation must necessarily be thin so that the designer can fit in the hundreds of turns that are necessary. Vibration, age, high operating temperatures, abrasive dusts, atmospheric contaminations, loosening of the windings, a defective starter, or several of these occurring together, weakens insulation to a point where a short circuit develops between turns.

Whatever the cause, we know that a substantial number of synchronous machines now in service have shunted field turns. (The percentage may run as high as 10% based on the author's experience). Actually, a shunted turn on a typical field coil has little effect on machine operation. But the heat from one shunted turn causes more breakdowns in adjacent insulation (especially if there are frequent starts or if starting time is long because of low voltage or heavy loads).

Once several turns have become shunted, machine performance begins to deteriorate fast, even though the increase in field current may never be enough to show up on the control field ammeter. The magnetic circuit or the heat distribution within the rotor, or both, become unbalanced. This in turn causes vibration that will eventually force a shutdown of the motor. This deterioration process may take from a few hours to months or even years to go through its course.

The goal is catch the shunted turn while it is still a *potential* source of trouble and schedule repair during a planned downtime. Fortunately, almost any plant can do this (or hire it done) with a simple preventive maintenance test that checks variations in voltage drop readings among the field pole windings. The check requires only a short time, little skill, and minimum equipment. Power companies have been using the method for at least the last several years, but we find many industrial plants are not aware of the test or of its importance.

The test is made by applying a-c line voltage across the d-c field and measuring the voltage drop across each pole winding with a voltmeter. Each shunted turn, of course, acts like a short-circuited transformer secondary and reduces the impedance (thus the voltage drop) across that pole proportionally. Note in the test voltage drop plots (above) of two different 10-pole motors how severe the voltage drop is for even a simple shorted turn, and how the impedance of adjacent coils is affected by shunted turns on one pole.

In making the test, make sure that the motor control is deenergized, and the field switch is open. The exposed collector rings should be insulated to protect the test operator against accidental contact. Where connections between windings are inaccessible, the voltmeter leads can be clipped to sharp-ended prods (such as ice picks) to pierce the insulation. If 115 volts will not produce sufficient voltage across each pole for an accurate reading on the voltmeter available, it may be necessary to use a 230-volt source.

When interpreting the voltage plot, variations of 3% and below can generally be disregarded. Any reading approaching 10% off normal is almost a sure sign of trouble. Occasionally an off-normal reading will be caused by a cracked or defective damper bar on the pole. So check this possibility before going ahead with rewinding.

IT'S BOUND TO BE BETTER WITH A USS STEEL STRAPPING MACHINE

A machine like this can save you $6,000 a year...and more!

It's the USS Model 12 Automatic Round Steel Strapping Machine. The Joliet Works of U. S. Steel's American Steel and Wire Division uses it to strap all their nail cartons. Formerly, it was necessary to stop the conveyor line about 20 times per day to change carton sizes. Each change-over took over five minutes. With installation of the Model 12, the change-over takes only a matter of seconds. Previous strapping methods required two-way tying for sufficient strength. This has been eliminated with the round steel strap. Now, one round steel strap gives the same strength, thus reducing strapping costs by shaving material needs by thousands of feet per day.

At ASW, the Model 12 straps thousands of nail cartons daily with strong, 16-gauge USS Round Steel Strapping. In addition to practically eliminating change-over time, the labor-saving Model 12 takes only 7½ sq. ft. of floor space and weighs only 1,300 pounds.

Find out how the automatic Model 12 can help cut costs and speed production in your operation. See our new industrial film showing many possible applications for the Model 12. Send the coupon.

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"We can count on Sam Austin of American Mutual," says President Charles W. Coker of Sonoco Products Company of Hartsville, South Carolina. "Sam leaves no loose ends and he knows the answers to our problems. With his help, over the past five years, we've been able to reduce our Workmen's Compensation cost 43.5% below the average of the industry."

Better protection – lower costs are our constant aim in serving policyholders. See the American Mutual man in your area. He's listed in the Yellow Pages. Remember, every American Mutual office is fully staffed with experts . . . who are there when they're needed.

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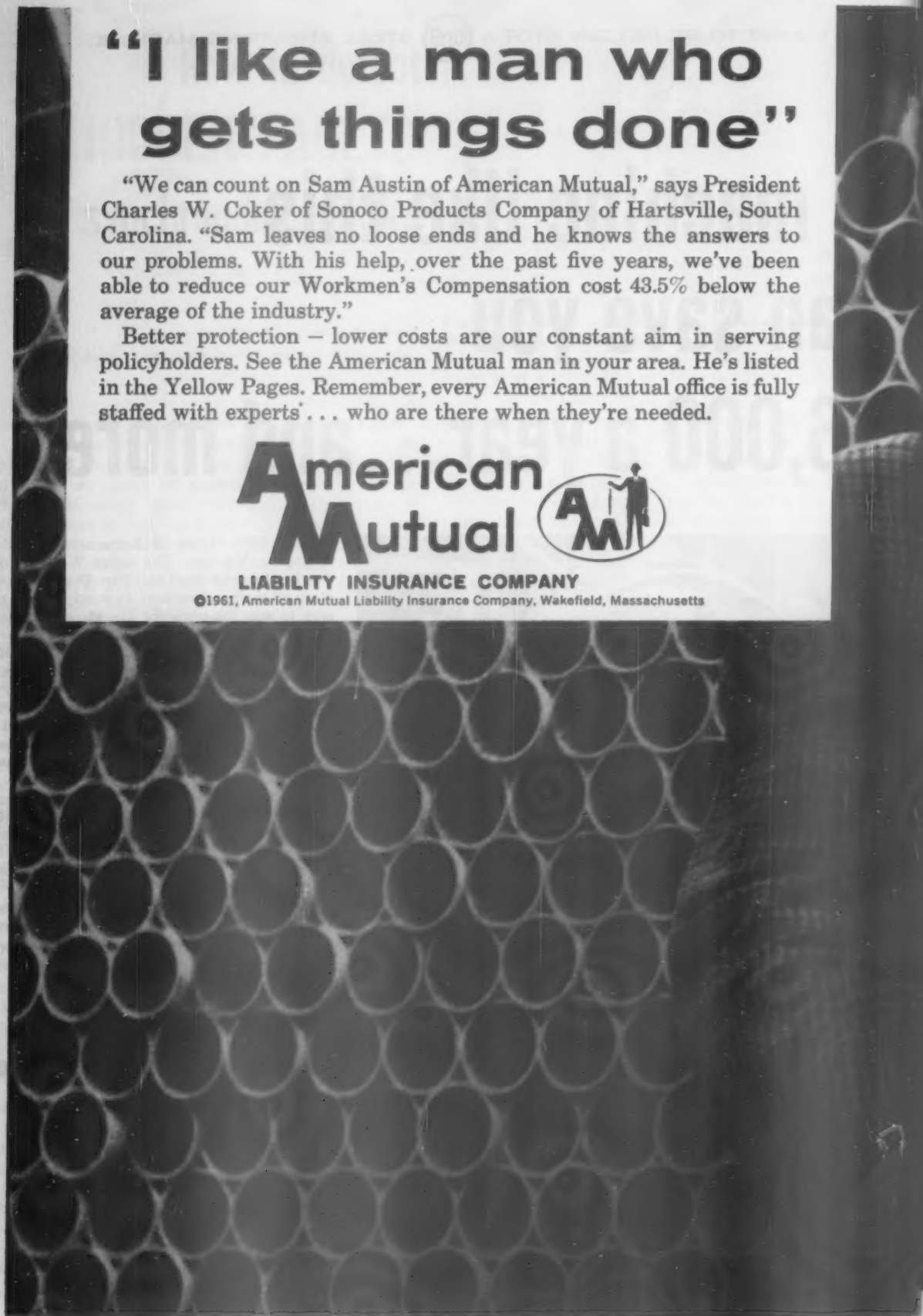

At the Hartsville plant of Sonoco Products Company, world's largest producer of paper tubes and cores, President Charles W. Coker, left, discusses production with Sam Austin, Sales Manager of American Mutual's office in Columbia, S.C. Sonoco has twelve other plants from coast to coast, all insured with American Mutual.

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EQUIPMENT NEWS

For more data, circle item numbers on Reader Service Card next to back cover.

Sight and sound speed step-by-step skills

Program your own sound and slide presentation of how a job must be performed with this Audio Graphic System. An operator, following the audio-visual sequential instructions on a screen at his work station, can save time while putting out a quality product.

All you need to prepare a program is a recording (made with basic unit) and a 35mm camera to photograph sequences.

Uses for this system include: Instruction of operators in short cycle assemblies, continuous guidance on long operations; teaching of equipment repair and adjustment; machine set-up; wiring and soldering techniques; methods training and explanation.

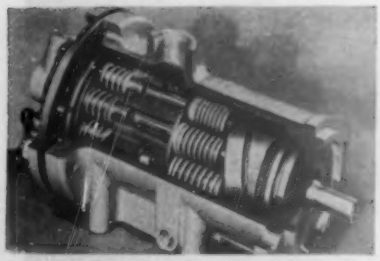
System can be set for three types of operation: Continuous, with automatic switching from one step to next; demand, with operator controlling foot switch that turns to next slide; timed, for automatic re-start after pre-set interval. *Graflex, Inc.* (Circle 89)

90—Water filter, with plastic or stainless steel tubular element, removes silt from cooling water, oil and corrosives from condensate, and contaminants from process and drinking water. Filters particles from 1 micron. Self-cleaning. *Hagan Chemicals & Controls, Inc.*

91—Air shower, for clean room entrances, filters particles to 0.3 microns at 99.97% efficiency. Air recirculates—no bleeding of clean room atmosphere. Used singly as pass-through type, or in multiples for large walk-throughs. Shipped assembled and ready to operate. *Agnew-Higgins, Inc.*

92—Hydraulic power package incorporates pump, motor, valving, and reservoir in one compact assembly. Low-cost unit needs only to be bolted down and lines connected to actuator(s). Motors from 1 to 5 hp., pressures to 1500 psi., 1800 rpm. *Vickers Inc.*

93—Recording voltmeter, with expanded scale, uses solid-state circuitry. Registers slight voltage variations. Particularly useful for recording effect of starting or overloads on feeders or sensitive circuits. Mechanical or electrical zero permits quick instrument check. *Esterline Angus Instrument Co.*

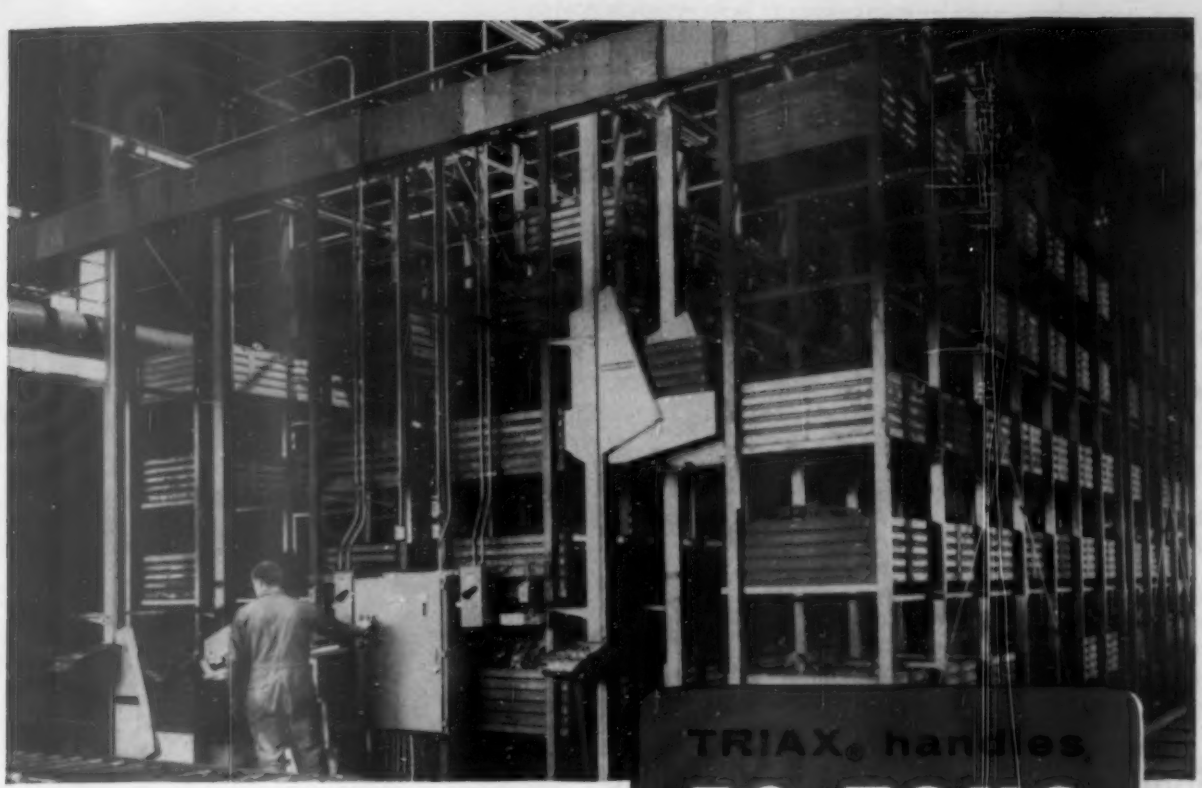


94—Hydraulic pump, variable-displacement type, fills wide range of fluid power needs. Has exceptional control versatility and high efficiency. Axial-piston design gives capabilities to 3000 psi., and 4500 rpm. No need for gear reduction. Long life. *The Weatherhead Co.*

95—Portable adhesive applicator weighs only 10 lb. when filled with gallon of high- or low-viscosity adhesives. Glue or bead pattern is adjustable. Operates on compressed air to 250 psi. Unit adapts for use on machines now using glue pots or wheels. *Systematic Corp.*

96—Ball valve, encased in conical-shaped Teflon mold, is one-piece capsule for variety of process flow controls. Adjustments made by turning screw-in base plate. With base plate removed, new capsule can be installed. In ⅛ to 2 in., to 1500 psi. *ACF Industries, Inc.*

Turn the page



One man, operating two TRIAX "Retriever" units, moves up to 50 tons of partially finished castings per 8-hour shift in or out of storage.

TRIAX® handles

50 TONS

OF CASTINGS

A DAY

Automatically!

SAVES SPACE — SAVES LABOR
ALL LOADS QUICKLY AVAILABLE

At the Marion Malleable Iron Works, Marion, Indiana, TRIAX Retrievers were installed to fulfill several different needs . . . to save time and labor, to save space, and to establish an accurate method of inventory control.

Now, one man can store or remove loaded boxes of castings from any one of 520 storage openings in an average cycle time of 2½ minutes by setting a few simple pushbuttons.

Estimates in savings of time and labor run to 33% each and an index card file tells the operator exactly which castings he has in storage. Production orders can be filled quickly and accurately.

In other TRIAX installations, Retrievers are being used to store tools and dies, electric motors, sub-assemblies and finished parts, huge rolls of plastic film and other types of products. We would welcome the chance to discuss the advantages of a Retriever for your plant or warehouse.

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No side squeeze on long lengths with open hopper

The news about this self-dumping hopper is open sides. Now you can efficiently handle long awkward strips, planks, pipes, and tubular parts that present haulage problems when moving them from place to place.

Hopper mounts on skids for easy pick-up and transport by fork truck. It can be equipped with casters for positioning manually near machines or to roll along with the work flow.

Automatically dumps by triping a lock handle on rear of hopper. Then it returns to normal upright position.

Unit is constructed from 3/16-in. gauge metal; reinforced with angle irons welded across front and back. In widths ranging from 3½ to 8 ft. to accommodate various lengths of material. *Roura Iron Works, Inc.* (Circle 97).

Slide it out or flip the top to reduce maintenance and servicing time

Ventilation may not "fan" your particular interest now that summer's over, but you cannot ignore this year-round problem. So here are a roof ventilator and a duct fan with easy access features that can cut your maintenance costs.

Roof ventilator (left photo) has entire motor and fan housing that flips back 90 deg. This exposes motor, drive assembly and fan for fast, easy inspection and servicing at convenient working height. Flip-top unit has up to 43,070 cfm. capacity.

Motor and fan assembly of Bifurcator duct fan (right photo) slides out on rails by simply removing half-section of housing cone. Isolated motor makes fan especially useful for exhausting abnormally hot, flammable, or explosive corrosive fumes or gases. Both units come with 12- to 18-in.-diameter fan wheels. *American Machine & Metals, Inc.* (Circle 98)

99—Switch-locking cover fits over existing toggle switch to prevent unauthorized tampering. Attaches to any metal wall plate. Uses cylinder-type tumbler lock. Comes in master keying and straight keying systems with two duplicate keys only. *Harvey Hubbell Co.*

100—Neoprene rubber washer fits around ends of outdoor fluorescent lamps to deflect moisture which corrodes sockets and contacts. Minimizes poor contacts—cuts maintenance costs. Works during rainfall or when water condenses from other sources. *Supro Lux Mfg. Co.*

101—Fluorescent lamp, formerly the 40-watt premium unit, is now offered as standard line at $1.30, a reduction of 10%. Gives 7% more available light (3100 lumens) than old 40-watt lamp. Available in 10 lamp types. Has rated life of 7500 hr. *General Electric Co.*

102—Cutoff valve automatically shuts off flow of flammable liquid to fire areas. Uses no counterweights or interior bellows; mounts in any position. Can be tested quickly. Comes with flanged ends in ½- to 6-in. sizes for up to 150 lb. pressure. *Cooper Alloy Corp.*

Turn the page

Entire girth weld on this Thiokol motor housing is x-rayed in one exposure.

For Thiokol's Redstone Division...

the metal parts countdown starts here

Right in the first stages of missile-motor processing, the Thiokol Chemical Corporation begins its countdown with a check—by radiography—of the soundness of each weld.

Putting power plants together for the nation's space program is intricate work.

So—Thiokol's inspection of metal parts begins with the welds because any seam weakness might well let the bird fly apart.

Also—if the motor uses a solid propellant, radiography provides Thiokol with a quick, sure way to examine the charge for unseen fissures or bubbles that could cause uneven burning and erratic runs.

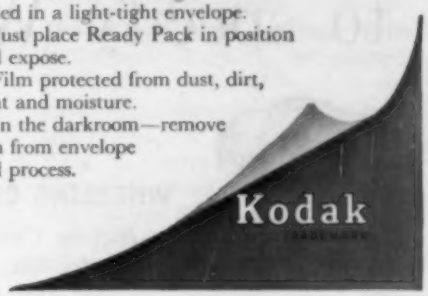
There are many *ways* to use radiography, but the *reasons* remain the same. Radiography saves time and money. It assures a reliable product. You needn't be a missileman to appreciate these advantages.

If you feel your product can benefit from radiography, talk to an x-ray equipment dealer or write us for a Kodak Technical Representative to call.

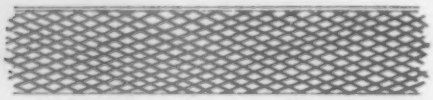
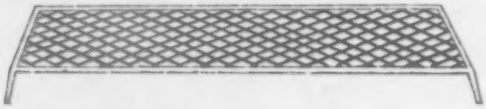
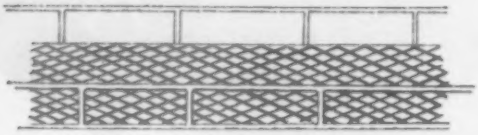
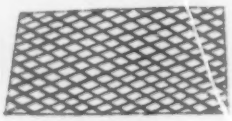
Arrow points to faulty weld caught on Kodak Industrial X-ray Film.

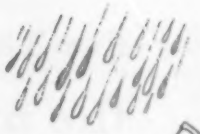
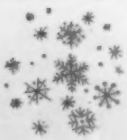
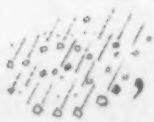
Now . . . Ready Pack in ROLLS and SHEETS Kodak Industrial X-ray Film, Types AA and M in 200-ft. rolls (16mm, 35mm, 70mm) and sheets (8 x 10, 10 x 12, 11 x 14, 14 x 17).

- No darkroom loading—film sealed in a light-tight envelope.
- Just place Ready Pack in position and expose.
- Film protected from dust, dirt, light and moisture.
- In the darkroom—remove film from envelope and process.



EASTMAN KODAK COMPANY
X-ray Sales Division Rochester 4, N.Y.

Today, you'll find more and more walkways  , stairs , mezzanines  and skywalks  are made of Wheeling Expanded Metal  .

That's because unwanted rain  , snow  , sleet  , mud , oil and grease go right through it . So does light , heat and fresh air . No wonder it pays to specify Wheeling Expanded Metal!

Wheeling

WHEELING CORRUGATING COMPANY • IT'S WHEELING STEEL!

Steel

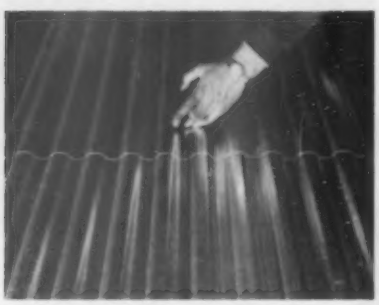
Warehouses: *Boston, Buffalo, Chicago, Columbus, Detroit, Kansas City, Louisville, Martins Ferry, Minneapolis, New York, Philadelphia, Richmond, St. Louis.* Sales Offices: *Atlanta, Houston, New Orleans.*

For more facts Circle 461 on Reader Service Card

OTHER WHEELING PRODUCTS

Wheeling Continuous Weld Steel Pipe gives strong, dependable, low-cost service . . . usually outlasts the building itself.

NEW, STRONGER Wheeling Super-Rib Steel Roof Deck has an exclusive vinyl protective coating . . . comes in unlimited lengths.



Wheeling Tensilform® . . . with conventional or light aggregate concrete . . . gives structures excellent lateral stability.

Wheeling SofTite® Cop-R-Loy® Galvanized Steel Sheets, for heating and air-conditioning ducts, will not flake or peel under rough use.

Begins on page 124

EQUIPMENT NEWS

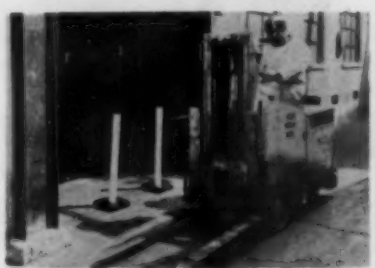
For more data, circle item numbers on Reader Service Card next to back cover.

103—Pilot light, built extra-rugged, has two separate 3-watt low-voltage coiled tungsten filaments connected in series with two mounts—one for each filament. Lamp is ½-in. in diameter and about 1½ in. long. Average life: 1500 hr.; 125 v., 6 watts. *General Electric Co.*

104—Portable bearing tester measures radial play in ball, roller, and self-aligning bearings with inner and outer race. Constant pressure readings in 1/10,000th-of-in. increments. Handles bearings from 5-mm. to 6-in. bore. Easy to operate. *Southwest Products Co.*

105—Semi-automatic welding system, for thin gauge materials, has wire drive control and air-cooled 22-oz. torch which can be adapted to present systems. Portable 200-amp. unit has 90 to 424 in. per min. range. Uses wire to 0.047 in. *Westinghouse Electric Corp.*

106—Slide projector has 80-slide revolving tray with jam-proof free-action gravity-feed system. Offers automatic projection or manual control at projector, or remotely. Slides can be changed easily—no spill if tray is dropped. Lamp: 300 or 500 watt. *Eastman Kodak Co.*



107—Safety lane markers have interchangeable yellow tubes 12 to 72 in. long which fit heavy 10-in. square base. High-visibility—useful in plants for marking lanes for fork trucks and other rolling equipment. Impact resistant, permanent color. *Stokes Molded Products.*

108—Clutch-brake package drive is rugged, compact, pre-aligned. Permits up to several hundred machine cycles per min. Can be belt-, chain-drive, or in-line mounted. Easy to service in field—reassembled without alignment. *Warner Electric Brake & Clutch Co.*

Turn the page

Powell FLOW-MATIC system discharges box contents automatically, via gravity feed, at proper work level. Lift truck has easy access to load and unload boxes.

POWELL FLOW-MATIC®

trims handling time 30%, saves 20% in storage space

Federal-Mogul Division improved its bulk handling of small parts with a low-cost Powell FLOW-MATIC materials handling system. Its Cleveland Plant gained more than 20% in limited floor space, saved 30% in handling time . . . while producing 60-80 million bushings, spacer tubes and washers yearly.

Simplify your production, handling and storage with the Powell FLOW-MATIC system. Write for *Bulletin FM* today.

THE POWELL PRESSED STEEL COMPANY

DEPARTMENT 101-10 • HUBBARD, OHIO

Materials handling is our only business

Powell FLOW-MATIC systems reduce handling time as much as 48%.

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

109—Short-Arc welder deposits tiny drops instead of spray; intermittent deposition prevents burn-through. Low cost 200-amp. unit has wire-feed control and light, cool torch that adapt to many existing power supplies. Portable control works in any position. *Linde Co.*

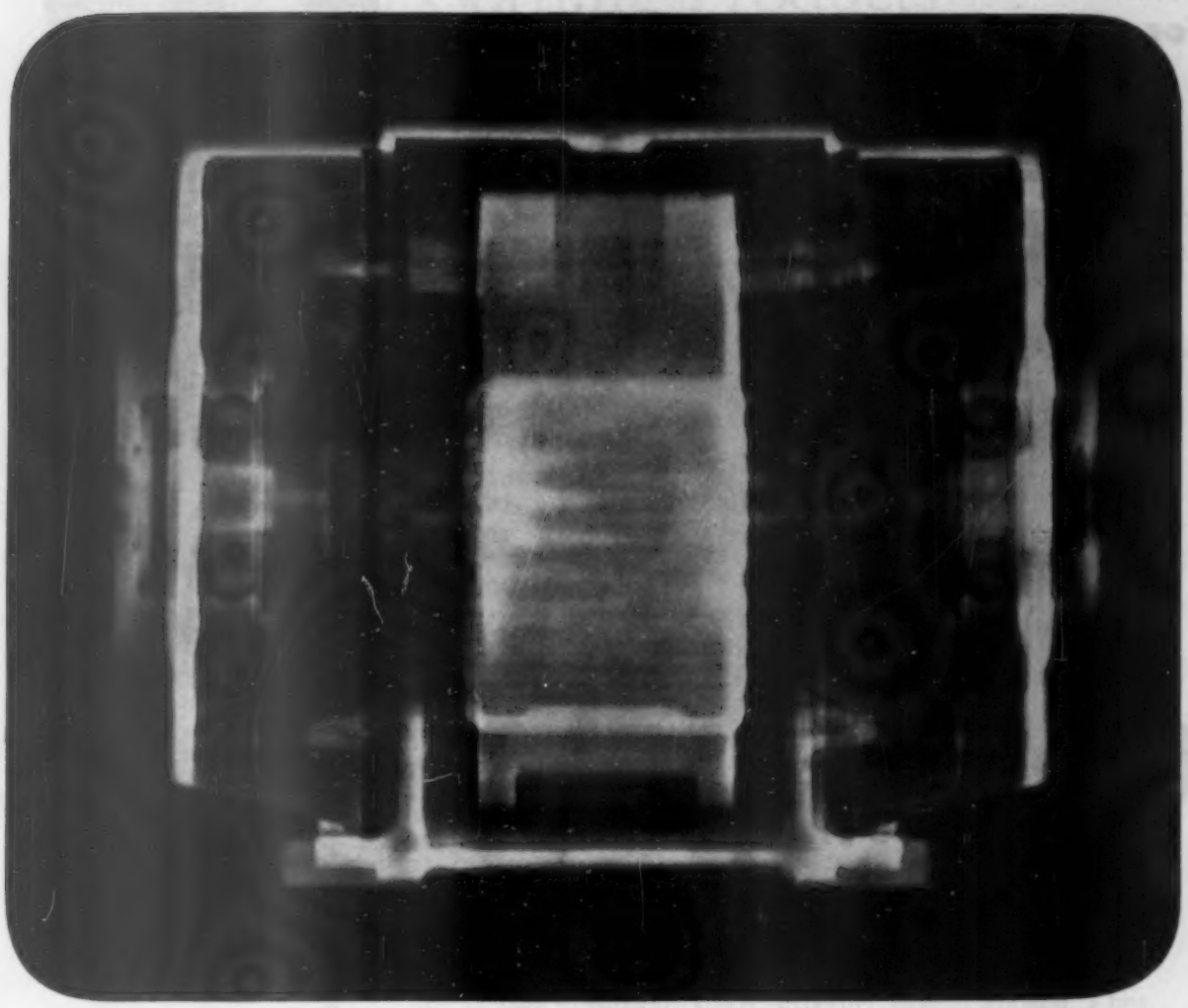
110—Packaged clean room, 500 sq. ft., comes complete with absolute filtration, controlled air conditioning, flush lighting, washroom facilities. Low cost unit expands by adding other mobile units. Optional equipment. *Controlled Atmosphere Enclosures Mfg. Co.*

111—Plug-in adapter quickly converts 2-wire duplex wall receptacle to 3-wire grounding receptacle. Handy for temporarily grounding power tools and portable equipment to assure safety. To install remove one screw from cover plate. Adapter screw grounds. *Harvey Hubbell Co.*

Turn the page

ALLIS-CHALMERS

A-1508



Actual radiograph of a 5-hp open-type motor taken with a 24-million volt Allis-Chalmers Betatron.

X-ray view of motor health

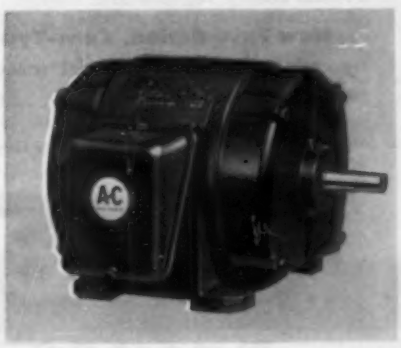
Invisible standards of perfection increase life expectancy of every Allis-Chalmers motor

The exceptionally long performance of A-C open motors proves the value of thinking *beyond* established standards of design . . . of taking "significant new achievement" as the ideal.

This ideal led to many refinements for A-C open motors: double-shielded bearings that keep dirt out and allow controlled migration of grease, permanently numbered leads for easy identification and connection, and heavy-duty cast iron frames that resist corrosion and keep rotating parts perfectly aligned.

For totally-enclosed, open-type and *Super-Seal* general purpose motors, and electrically or mechanically modified definite-purpose motors, choose the motor built to invisible standards of perfection. Choose A-C. Special application help available.

Call your nearby A-C representative. Or write **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wis.* Super-Seal is an Allis-Chalmers trademark.



For more facts Circle 463 on Reader Service Card

New RIDGID No. 141 Geared Threader

For 2½", 3", 3½", 4" Pipe and Conduit

Save Time...Cut Costs on all large threading jobs!

1. Only 1 Set of High Speed Dies threads 2½", 3", 3½" and 4" pipe and conduit. No extra die sets to change or lose! Die size selector plate sets quickly and locks at desired size. Easy adjustment for tapered, straight, over or under size threads.

2. Jam-Proof for safe threading by power or hand. Drive pinion kicks out automatically. Die head *Can't Jam* . . . avoids costly repairs and delay.

3. New Fast-Action, Cam-Type Workholder sets to size by quick turn of collar. Set screw holds work centered for perfect threads every time . . . adjustable for drip threads.

Your Supply House has them! Order your new RIDGID No. 141 Threader today!

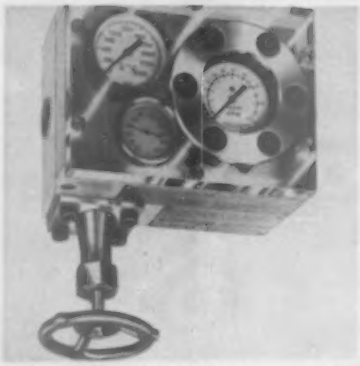
RIDGID

The Ridge Tool Company, Elyria, Ohio, U.S.A.

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card



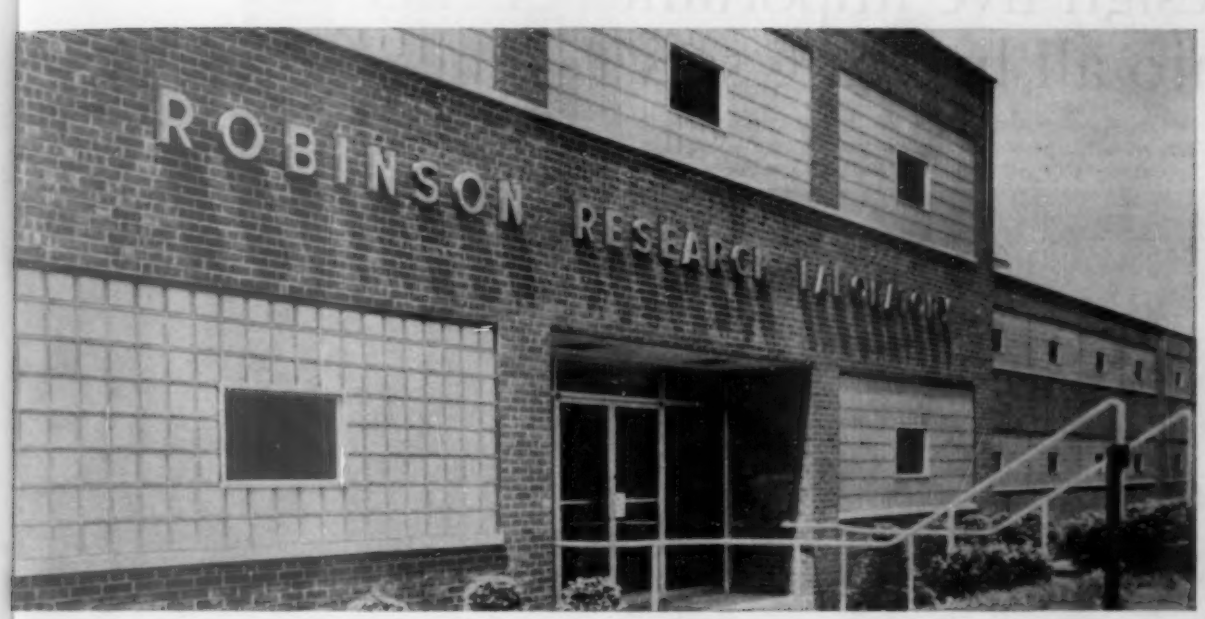
112—Hydra-Sleuth is compact, low cost, portable instrument that pinpoints problems in hydraulic systems up to 3000 psi. Troubles show up as a drop-off in gpm. on flow gauge, as working pressure is developed with load valve. Built-in blowout plug. *Schroeder Bros. Corp.*

113—Flaw-detecting kit spots hairline cracks or straight-through leaks in aluminum, copper, plastics, stainless steel, etc. Uses penetrating fluorescent liquid which glows under black light. Portable; takes only 3 to 5 min. for inspection. *U. S. Casting Repair Corp.*

114—Strip-chart recorder automatically and continuously clocks operating and downtime of up to 10 machines simultaneously. Special waxed chart eliminates pens, ribbons, stylii. Price: $240 for 10-channel unit. Install at machine or remotely. *Electric Tachometer.*

Turn to page 136

See why Pittsburgh Corning Products make the things you build look better, last longer, cost less



example: PC Glass Block Panels bring four important benefits to Electric Boat

Even density lighting, good atmospheric control, attractive appearance and minimum maintenance. These benefits have proved the soundness of the decision by Electric Boat Company, Division of General Dynamics, to use PC Glass Blocks for new panels and sash replacement at their Groton, Conn., plant. Attractive on the outside, the Glass Block panels have virtually eliminated morning glare and afternoon shadow in laboratories and working areas.

The excellent insulating value of the blocks makes it far easier to insure accurate, pressurized atmospheric control within the building. Maintenance has been negligible . . . with nothing to rust, rot or need painting . . . and not a single instance of breakage or structural failure in the glass block panels.

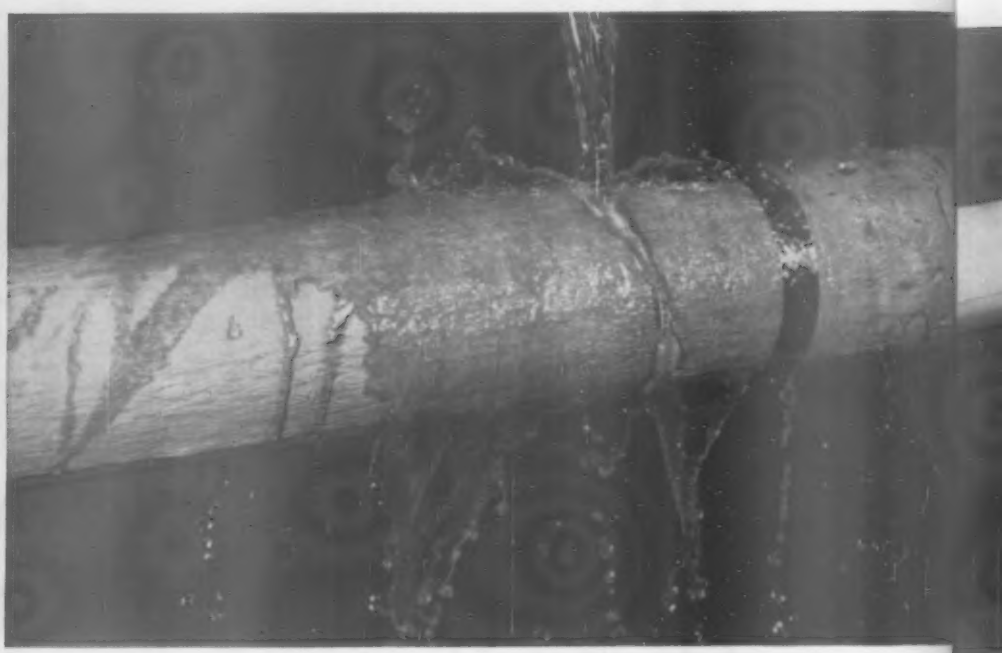
This kind of experience makes PC Glass Block panels the odds-on favorite to eliminate window problems in virtually any type of industrial plant or commercial building. Send for a free PC Window Renovation Kit that shows you what can be done to solve your window area problems, and helps you prepare an estimate of the cost.

Take advantage of the coupon on the third page of this advertisement.

PITTSBURGH **CORNING**

For more facts Circle 465 on Reader Service Card

example: FOAMGLAS® Stay-Dry Pipe Insulation to design five important benefits into all building service lines

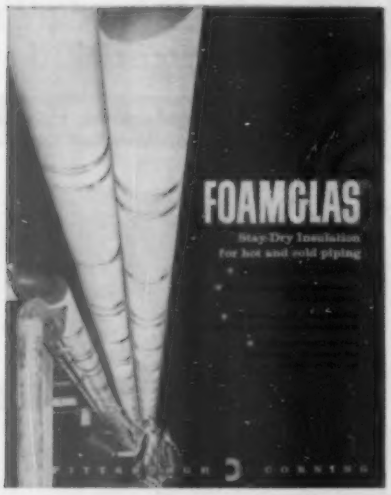


Insulation for building service lines—iced water, chilled water, low pressure steam or dual temperature—has frequently proved a maintenance headache. Now you can design away that headache with FOAMGLAS Stay-Dry Pipe Insulation and its combination of five critical benefits. First, since FOAMGLAS is incombustible and the jacket self-extinguishing, FOAMGLAS Stay-Dry Pipe Insulation substantially reduces fire hazards. Second, constant insulating value results from the absolute imperviousness of FOAMGLAS to all moisture. Separate vapor seals are unnecessary.

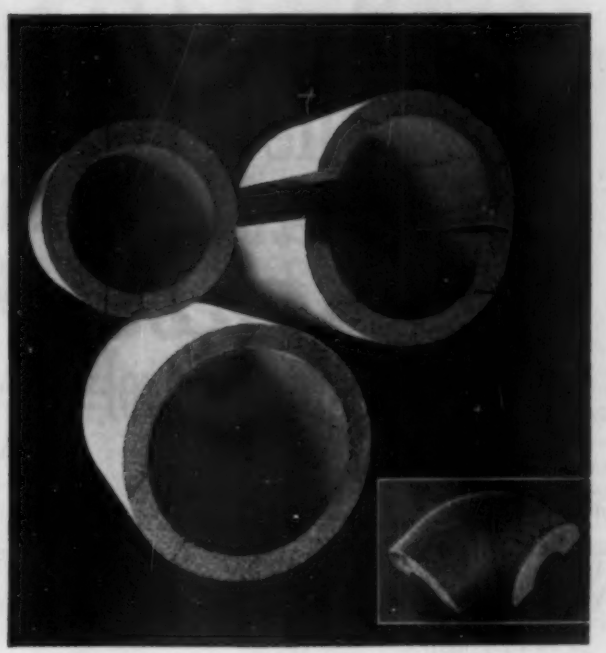
Next is the elimination of all weak spots in piping runs. The extraordinary compressive strength of FOAMGLAS prevents slump or sag on the highest vertical runs and saddle supports can never compress the insulation. Fourth, the insulation is furnished with a factory applied Kraft-foil jacket. And fifth, all these benefits can be applied to total piping systems since FOAMGLAS Stay-Dry Pipe Insulation is available in sizes from ½″ copper tubing to 12″ IPS with fitting covers and elbows to match.

PITTSBURGH pc **CORNING**

For more facts Circle 466 on Reader Service Card



Check the appropriate box on the coupon to obtain this brand new catalog containing complete specification and installation data on FOAMGLAS Stay-Dry Pipe Insulation.



PITTSBURGH CORNING CORPORATION
Dept. FF-101, One Gateway Center, Pittsburgh 22, Pennsylvania
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Please send me the PC product data checked below:

- ☐ FOAMGLAS-BOARD™
- ☐ FOAMGLAS Roof Insulation
- ☐ PC GLASS BLOCKS
- ☐ The PC 4 x 12 Block
- ☐ PC Color Glass Blocks
- ☐ GEOCOUSTIC® Acoustical Absorbers
- ☐ FOAMGLAS Low Temperature Insulation
- ☐ FOAMGLAS Insulation for Industrial Piping
- ☐ FOAMGLAS Stay-Dry Pipe Insulation
- ☐ FOAMTHANE™ Polyurethane Insulation
- ☐ FOAMGLAS Insulation for Curtain Wall Panels
- ☐ PC Sculptured Glass Modules

Name_____

Company_____ Title_____

Address_____

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Four tons of valuable dust are recovered daily by this Dustube Collector, ventilating the processing of sintered phosphate ores in a prominent chemical plant.

Dustube® collectors beat the heat in fume control

A demonstration of WHEELABRATOR'S

VITAL VALUES

Chemical and metallurgical process gases, with temperatures far beyond the range of conventional synthetic fabrics, are no problem to Wheelabrator dust and fume control systems. Dustube collectors equipped with special filtering fabrics, such as silicone-treated fiberglass, have the Vital Capacity to withstand acids, alkalis, or abrasive materials encountered in specific applications, and filtering at temperatures to 550°F, eliminate the need for costly pre-cooling equipment. Since dust is collected in the dry state and removed by repressuring or shaking, recovery of valuable materials is facilitated. Collection efficiencies above 99% are normal. For engineering consultation on your dust and fume control problems, call on Wheelabrator. Write for bulletin 562-D.

VITAL VALUES FOR INDUSTRY

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DUST AND FUME CONTROL

WHEELABRATOR CORPORATION, 374 S. Byrkit St., Mishawaka, Ind.
In Canada: WHEELABRATOR CORP. of Canada Ltd. P.O. Box 490, Scarborough, Ontario

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

115—Closed circuit TV is completely weather-tight for installing in exposed, dusty, hot or cold, and inaccessible locations. Provides months of maintenance-free surveillance without adjustment or parts replacement. "Sees" across 500 ft. by day. *Diamond Electronics.*

116—Reverse flow check valve stops dangerous backflow of gases. Prevents contamination in regulators, accidental mixing that causes explosions, reverse flow when mixing gases, and suck-back on exhausted cylinders. Easy to install on regulators. *Harris Calorific Co.*

117—Portable pyrometer, battery-operated, senses without touching critical temperatures (to 1/10 C.) of plastics being extruded, paper or fabrics being coated, calender rolls, inaccessible or moving surfaces. Detects hot parts, bearings. *Williamson Development Co.*

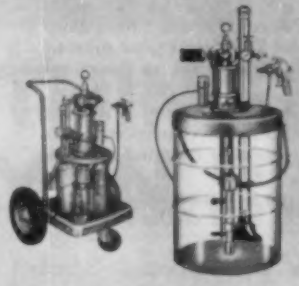
118—Static motor starter replaces electro-mechanical or ignitron contactors for frequent starting service. Arc-free; has no moving parts. Across-the-line start-up to 20 hp., up to 75 hp. with reduced voltage. Adapts to automatic control. *Westinghouse Electric Corp.*

Turn the page

NOW FOR LESS THAN $350*—A COMPACT, COMPLETE AIRLESS PAINT SYSTEM!

New Alemite 5-gallon Portable Hydrastat Model!

Model 707



Portable Hydrastat Spray Systems, with 24 to 1 ratio pump. Pumps from 1 to 10 gallon containers. Rolls as a unit—to work inside or out.

Alemite "78" Heavy Duty Pumps for use with 54 gallon openhead drums, standpipes and paint vats for production line finishing, or outdoor maintenance.

Here's the one-man, one-gun airless paint pump that goes everywhere—inside or out! Letting you quickly, easily spray paint on straight time without costly shut-downs. The Alemite "707" is lightweight (only 17¾ lbs.), has a handle for easy carrying, fits any 5-gallon paint container. It is precision engineered to operate at top efficiency all day with less than 7 c.f.m. of air.

The cost of this new Alemite "707" pump is surprisingly low—yet savings just *start* with the price! Hydrastat spraying cuts bounce-back because it uses no heat or atomized air. Paint goes 40% farther, goes on 80% faster for significant savings in materials and man-hours.

For more information on other Hydrastat models available contact your Alemite Representative now!

**Consists of pump, regulator assembly, filter, nylon hose with flexible static wire, gun and TC tip.*

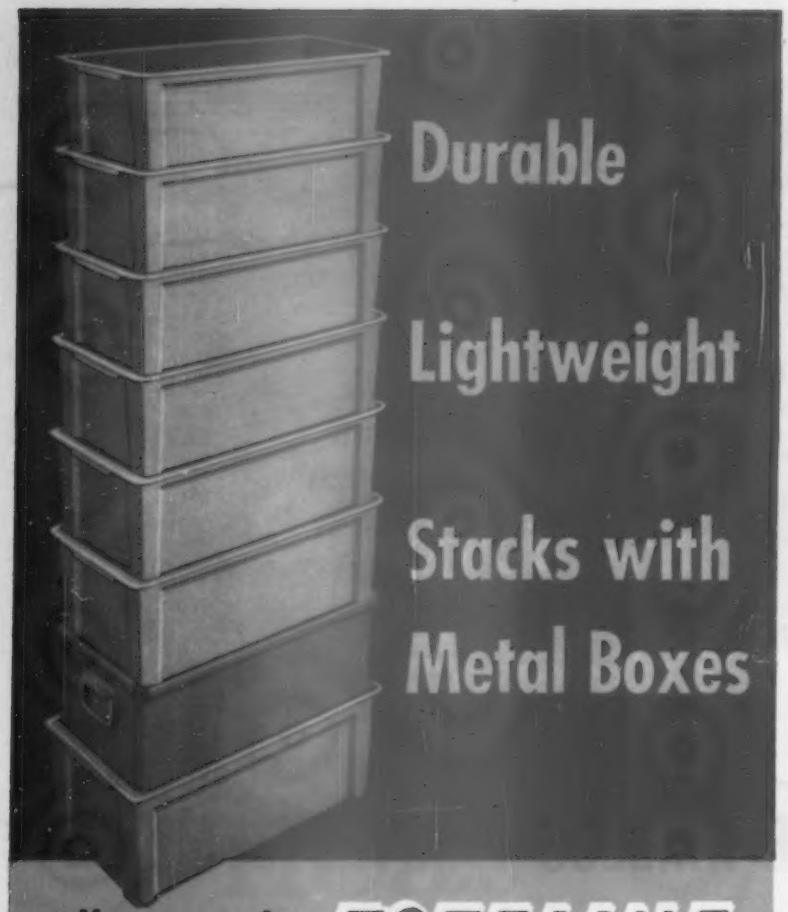
In Canada:
Stewart-Warner Corporation of Canada, Ltd.
Belleville, Ontario

Symbol of SW Excellence

ALEMITE
DIVISION
STEWART-WARNER
CORPORATION

Dept. B-101, 1650 Diversey Parkway, Chicago 14, Ill.

For more facts Circle 468 on Reader Service Card



All in one by TOTELINE

Now . . . a sturdy tote box of strong-as-steel molded fiber glass which stacks interchangeably with your present metal boxes of the popular 10 by 20 by 8-inch size.

You can benefit from the advantages of durable molded fiber glass immediately by introducing Toteline Model 538-1 into your present system. Then replace metal boxes with Toteline boxes as the metal boxes need replacement.

Toteline boxes last indefinitely without maintenance. They are immune to rust . . . you can't dent them and they never need straightening. There are no sharp edges . . . just smoothly rounded corners. Model 538-1 cleans easily with hot water.

Molded handles are a part of the integral, one-piece stacking lip. Steel wire, completely concealed within the edges of the box, adds strength and rigidity.

For further information and descriptive catalog, just cut out this coupon and clip to your letterhead. Please furnish your name and title.

NAME_____

TITLE_____

MOLDED FIBER GLASS TRAY CO., Linesville, Pa.

Chosen to Represent the U.S Reinforced Plastics Industry at the 1959 International Trade Fair in Zargreb, Yugoslavia

Begins on page 124

EQUIPMENT NEWS

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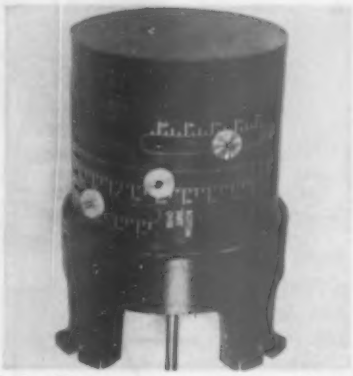


119—Rotary cam switch, with up to six cams, can be adjusted quickly from outside even while cams are in motion. Rotation can be reversed without tripping switch. Uses heavy-duty bearings. Rated 15 amp. up to 480 v. a-c. *General Automation Corp.*

120—Electric water heater stores from 284 to 1300 gal., with recovery capacities from 41 to 410 gph. Working pressures are 100, 125, or 150 psi. Immersion elements for 208, 220, or 240 v. Compact, automatic. Skid support permits installing anywhere. *Patterson-Kelley.*

121—Unbalance indicator electronically determines amount of vibration and angular position of unbalance. Synchronizing pulse comes from moving part. Also indicates rpm. Portable, operates on 110 v., a-c. For grinding spindles, motor assemblies. *General Motors Corp.*

Turn the page

BUY WORTHINGTON PUMPS LOCALLY IN 235 CITIES

Take a look in your Yellow Pages under "pumps" and see. Chances are overwhelming that you'll find a Worthington dealer there, and only a local call away. We have over 235 distributors covering nearly every trading area in the country.

So what's your advantage? One is that if you standardize on Worthington standard pumps, for locations coast-to-coast, Worthington can be a local supplier to every installation. Another is that you're dealing locally, face-to-face with men who are willing to be held responsible—and who will be there when needed.

Extremely important—you get very quick service. Remember, over 200 of these distributors stock parts—seals, bearings, packing, impellers—the kind of parts that handle 19 out of 20 emergencies. And many stock a variety of commonly used pumps.

Perhaps, however, what's of most interest to you is the seven regional Worthington assembly points. They're all F.O.B. points—even the furthest plant from a Worthington assembly point pays less than 800 miles freight . . . and you're probably much closer. From any one of these locations we can deliver more models than most other manufacturers build all together.

If you don't know who your Worthington distributor is right now—take a quick look in the Yellow Pages. We think you'll like the service you get. Worthington Corporation, Section 20-20, Harrison, N. J.

WORTHINGTON

For more facts Circle 470 on Reader Service Card

New H-30 PAYLOADER®

has 25% more capacity

When the Model H-30 was originally introduced, more than a year and a half ago, it was far ahead of any other tractor-shovel in its class. It has been exceptionally well received by contractors, public bodies, sand and gravel producers, and many others — praised by owner and operator alike. Now, HOUGH's continuing program of research, development and improvement, creates the new H-30 series "B" model — an even better machine.

More Capacity: With 1¼ cu. yd. bucket, this new model has 25% more capacity without sacrificing the exceptional stability and balance of the original H-30.

More Safety: The only loader in its class with boom arms positioned ahead of and away from the operator. It has walk-in operator compartment, new hand rails, new adjustable bucket seat and unmatched operator visibility.

Less Maintenance: The only loader in its class with simplified boom mechanism having 6 to 12 fewer pivot and grease points to service. All bucket and lower-boom pivot points sealed against dust and dirt.

More Power: More hp per pound than comparable loaders. Torque-converter proportions power properly between drive-train and hydraulic needs.

Better Braking: Only loader in its class with 4-wheel, sealed hydraulic brakes, and with "Operator's choice" dual brake pedals that permit operator to brake with or without transmission engaged. Exclusive HOUGH axle design allows servicing of brakes without removing and exposing the planetary hubs to dust and dirt.

It's the only loader in its class with full power-shift transmission that does not have to stop for "range" shifts . . . with separate fan-cooled oil-to-air radiator to cool torque-converter transmission oil . . . with closed, pressure-controlled hydraulic system to keep out air-borne dust and moisture.

For additional information, see your HOUGH Distributor or return the coupon.

HOUGH®

THE FRANK G. HOUGH CO.
751 Sunnyside Avenue
Libertyville, Ill.
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

Send data on new PAYLOADER — the Model H-30B.

Name _____
Title _____
Company _____
Street _____
City _____ State _____
9-8-2REV

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

122—Protective headgear consists of skull-guard and snap-on attachments to meet all job requirements. Headpiece of lightweight plastic adjusts in quarter sizes from 6½ to 8. Interchangeable plastic shield attachments include eye and face protectors. Low cost. *Dockson Corp.*

123—Centrifugal switch has weights fastened directly to one-piece steel disk, reducing friction to minimum. Provides high repetitive accuracy at factory-adjusted speeds from 900 to 4000 rpm. These snap switches come in dust-proof enclosures. Price $100. *Square D Co.*

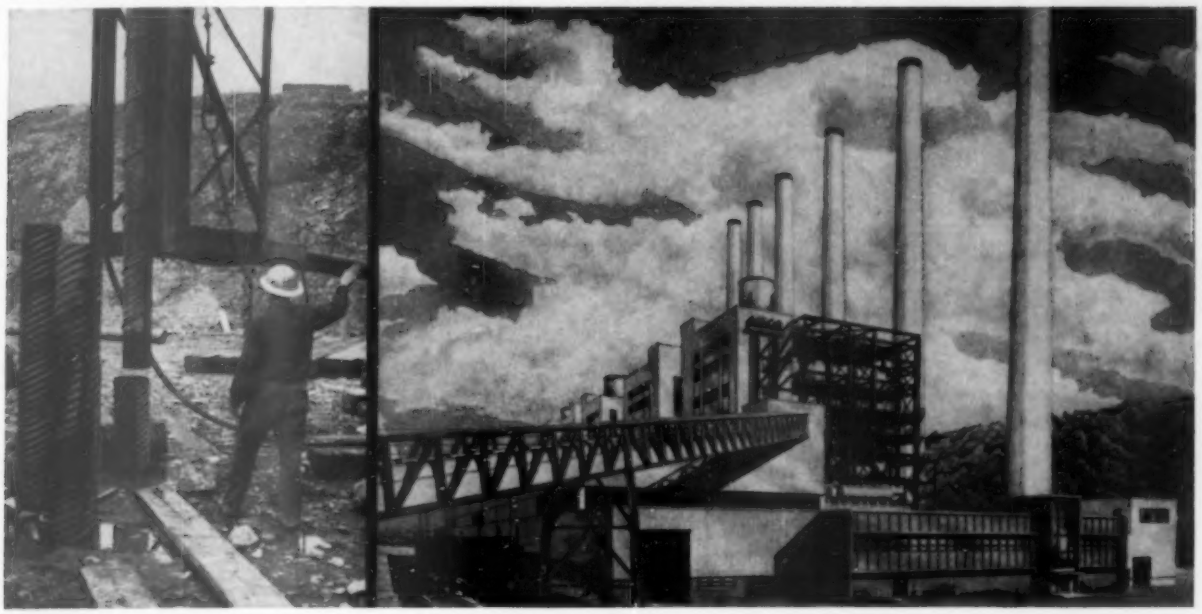
124—Tubular air feeder has one-piece vibrator with silent-type piston as only moving part. Reduces spare parts inventory; cuts maintenance. Forty-inch tube (8-in. diameter) uses only 16 cfm. at 50 psi. Has pressure range from 20 to 70 psi. *National Air Vibrator Co.*

Turn to page 145

Armco Foundation Products Support $36-Million Power Plant

New steels are born at Armco

Engineers and Consultants: Gilbert Associates, Inc., Reading, Pa.
Piling Contractor: Candler-Rusche, Inc., Detroit, Michigan
General Contractor: Maxon Construction Co., Inc., Dayton, Ohio



Collapsed mandrel, used in driving HEL-COR Pile Shells, is being withdrawn after shell has been driven to required resistance.

Artist's conception of the ultimate plant at the Portland Generating Station of Metropolitan Edison Company, Reading, Pa. In foreground is completed Unit No. 1; behind it is Unit No. 2, now under construction.

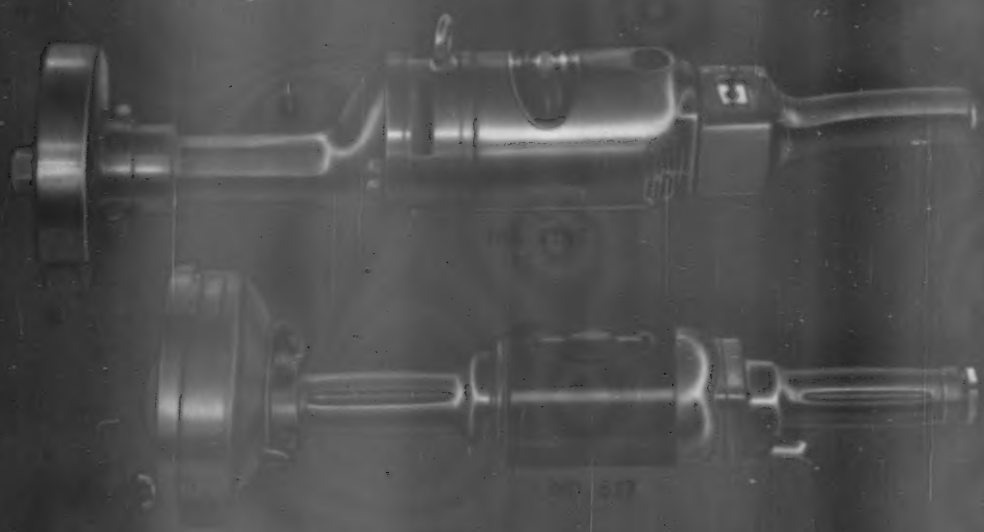
Portland Station, Metropolitan Edison Company's new generating plant, is being expanded to house a second unit that will cost $36,000,000.

Steel — For economy, strength, durability

This new unit, with an expected capacity of 250,000 KW, is supported by 54,000 feet of Armco Foundation Piles. More than half of this footage is Armco HEL-COR® Pile Shell, a mandrel-driven corrugated metal pipe. These shells are 12¼" O.D. diameter, supplied in 38- and 60-foot lengths. Remainder of the foundation support consists of welded steel Armco Pipe Piles, supplied in 10- and 12-inch diameters, with .188-inch wall thickness.

Armco Foundation Pipe, easy to drive, easy to inspect, provides adequate support for buildings and bridges. For information on Armco Foundation Products, write us. Inquiries are handled promptly by local sales engineers. **Armco Drainage & Metal Products, Inc., subsidiary of Armco Steel Corporation, 6641 Curtis Street, Middletown, Ohio.**

ARMCO Drainage & Metal Products



Persuasive *with*..

Use SIOUX.....all the way through!

..Abrasive!
Sioux
Ask for Catalog No. 61.
ALBERTSON & CO., INC.
Sioux City, Iowa, U.S.A.

New GENERAL ELECTRIC SHOPTROL system

...monitors individual work stations...displays production status at a control center for timely reactions to factory conditions.

The GE SHOPTROL SYSTEM is a factory monitoring and data collection system that monitors work stations and records production data at a central point. Each work station's status is visually displayed on a Status Monitor. Status Monitors present a panoramic view of up-to-the-minute factory conditions for visual display at the Production Control Center. Work stations have an operator control station, or an alarm station terminating at the Control Center. Depending on complexity of communication needed and data to be transmitted, a paging selector may be added to each work station.

The Shoptrol System records, in hundredths of hours, time elapsed for operations, set-up and tear down, unavoidable delays, machine running, and machine off conditions. The Shoptrol System can record time elapsed, or count pieces or operations.

The Shoptrol System provides direct signal communications from work stations to the Production Control Center. The operator control station and paging selector have phone jacks to provide entry into the telephone intercom. Units are ruggedly built for dependable life in factory conditions.

Totals recorded from the Status Monitors at the end of shift produce information for production control analysis and management decision making. The data is readily convertible to punched cards or paper tape for input to a data processing system. For more information, write for brochure CPB-152, General Electric Company, Computer Department, Section 91V10, Phoenix, Arizona, or contact your nearest General Electric Computer Department District Office listed below.

THE GE SHOPTROL SYSTEM CONTRIBUTES TO GREATER PRODUCTION EFFICIENCY BY:

...providing constant communication between production control center, foreman, and work station operators.

...collecting and displaying current production data for each work station.

...increasing accuracy of production records.

...providing immediate production status for management at all times.

Atlanta: 270 Peachtree St. N.W., 522-1611 • **Boston:** 140 Federal St., HU 2-1800, Ext. 311 • **Chicago:** 120 S. La Salle St., 782-5061 • **Cleveland:** Williamson Bldg., 215 Euclid Ave., SU 1-6822 • **Dallas:** 3200 Maple Ave., RI 8-0589 • **Detroit:** 680 Antoinette St., TR 2-2600 • **Houston:** 4219 Richmond Ave., MO 7-3301 • **Kansas City, Mo.:** 106 W. 14th St., GR 1-2919 or GR 1-2920 • **Los Angeles:** 1010 S. Flower St., DU 1-3641 • **Louisville:** Bldg. 6, Appliance Pk., GL 4-7511 • **Minneapolis:** Plymouth Bldg., 6th & Hennepin, FE 2-7569 • **New York:** 122 E. 42nd St., PL 1-1311, Ext. 3205 • **Philadelphia:** 3 Penn Center Plaza, LO 8-1800 • **Phoenix:** Guaranty Bank Bldg., 3550 N. Central Ave., AM 4-3741-2 • **Pittsburgh:** 1634 Oliver Bldg., Mellon Sq., AT 1-6400, Ext. 566 • **San Francisco:** The Russ Bldg., 235 Montgomery St., DO 2-3740 • **Schenectady:** Bldg. 2, 1 River Rd., FR 4-2211, Ext. 5-4405 • **Seattle:** Dexter Horton Bldg., 710 Second Ave., MA 4-8300 • **St. Louis:** Paul Brown Bldg., 818 Olive St., GE 6-4343 • **Syracuse:** 1010 James St., GR 6-4411, Ext. 6141 or 6142 • **Washington, D.C. Area:** 7401 Wisconsin Ave., Suite 514, Bethesda, Md., OL 2-8100 • **In Canada:** Canadian General Electric Co., Ltd., Electronic Equipment and Tube Dept., 830 Lansdowne Ave., Toronto, Ontario, Canada. **Outside U.S.A. and Canada:** Producer Goods Export Department, International General Electric Company Division, 150 E. 42nd St., New York City, N.Y., U.S.A.

INFORMATION PROCESSING AUTOMATED BY GENERAL ELECTRIC

Progress Is Our Most Important Product

GENERAL ELECTRIC

CPA 91 (9-61)

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

125—Control switch sets off signal when object interrupts air flow across an opening. Needs no physical contact. Can be used to count or automatically control production equipment. Jet-Tron is rated 7 amp., 120 v., operates with 1.5 psi. air stream. *Automation Devices, Inc.*

126—Boxbander automatically applies band from ¼ in. up to boxes of any shape and size. Eliminates overwraps or hand sealing. Needs no skill to run; one operator can handle five machines. Continuous feed—does not need to be stopped to feed hopper. *Halm Instrument Co.*

127—Marking tool writes as fine as 1/32 in. on metals, plastics, ceramics, and glass at speeds to 12,000 blows per min. Air operated with 40- to 100-psi. pressures. Needs no special valves, controls or regulators. Lightweight, non-stalling, little vibration. *Kelsey-Hayes Co.*

Turn the page

You are looking at a revolutionary new wireless staff location system – Multitone Personal Call. Here is an entirely new method of cutting costs and increasing profits – through instantaneous, direct, private, fool-proof staff location. Push a button and you can locate and pass a message directly to executives, maintenance personnel, plant guards, engineers and supervisors wherever they may be. Personal Call can be used by anyone who can press a button or dial a phone. It uses 5-ounce transistorized receivers, and simple wire loop antenna. Personal Call is less costly to buy or lease than any other comparable electronic paging system, and operating costs are negligible. It completely obsoletes chimes, bells, buzzers, lights, loud speakers. Mail the coupon below to Multitone today – and start reaping the benefits immediately.

MULTITONE TRANSMITTER sends coded "beep" signals and voice.

MULTITONE RECEIVER is only 5 oz. light, clips to pocket.

Multitone Electronics, Limited – Dept. F
10 East 49 Street, New York 17, N. Y.

Please send me your 8-page brochure giving all the facts about the Multitone Personal Call paging system.

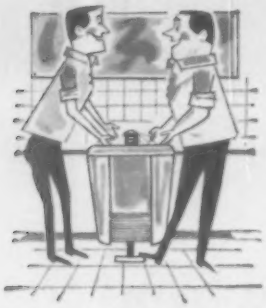
Name_____

Company_____

Position_____

City_____ Zone____ State____

For more facts Circle 475 on Reader Service Card

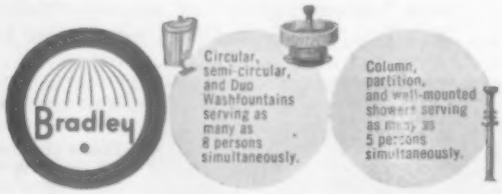


STOP THE SPREAD OF DISEASE (BY UNSANITARY FAUCETS) USE BRADLEY DUOS!

Then employees wash in fresh, clean running water! Dirty faucets turned on and off repeatedly, basins soiled by constant use — *these* are key points in the spread of harmful bacteria. Duos eliminate *both*.

Just a touch of the toe on the Duo's foot pedal serves clean, tempered water for two people. *And* — the running water rinses the Duo's bowl clean *during every use.*

Duos serve two people with *one* set of plumbing connections — cutting installation costs in half, saving washing time and valuable space. Enjoy *all* of these advantages — get Duos!


Bradley
Circular, semi-circular, and Duo Washfountains serving as many as 8 persons simultaneously.
Column, partition, and wall-mounted showers serving as many as 5 persons simultaneously.

Bradley Washfountains and Showers provide group facilities for as many as 8 and 5 persons, respectively . . . in industrial buildings of all types and sizes. For additional information, contact your architect, consulting engineer, or plumbing contractor. Or write for Publication No. 1380 to: Bradley Washfountain Co., 2215 W. Michigan St., Milwaukee 1, Wis.

61-108-R1

Begins on page 124

EQUIPMENT NEWS

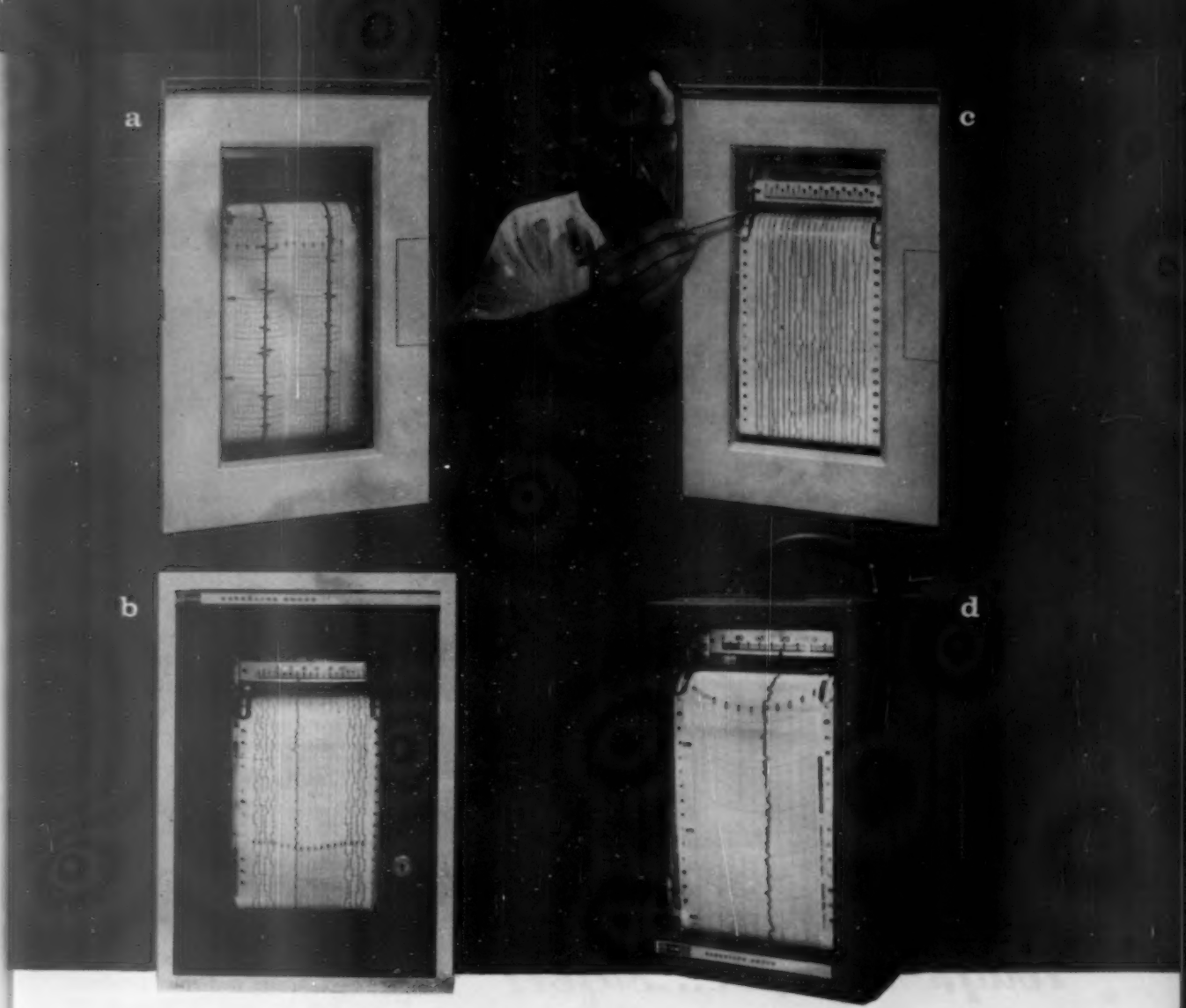
For more data, circle item numbers you want on Reader Service Card.

128—Dripless wall washer can be used during work hours without disturbing people—no motors, thus no noise. Portable twin tanks, on casters, hold cleaning fluid and fresh rinse water. Air pressure feeds solutions. One trowel washes, other rinses. *American Floor Machine Co.*

129—Time control, with one simple setting, turns lights on at sunset and off at any pre-selected time with no further adjustment for changes in daylight hours. Eliminates callbacks for seasonal resetting. Four-pole, single-throw, rated 20 amp. *Paragon Electric Co.*

130—Lift truck, with 6000- to 10,000-lb. capacity, has 6-cyl. engine developing 77 hp. Power steering is standard equipment. Clearances of 8½ in. at center and 6 in. below mast simplify travel over uneven ground, floors, or railroad tracks. *Allis-Chalmers Mfg. Co.*

Turn the page



Available in portable, wall, flush and projection mounting switchboard cases.

NEW Instrument Designs, Applications from Esterline Angus

New "602" Two-channel Recorder • Simultaneously records two variants on adjacent ½-sections of single 6"-wide chart. Applications: checking current and voltage, quality determination of arc welds, records of input vs. output.

New Analog-Event Recorder • One instrument does the work of two . . . simultaneously records analog data and up to 8 channels of event information on single 6"-wide chart. Applications: wind speed and direction, substation bus voltage and breaker operation, rate of production (speed) and conveyor operation.

New "620" Event Recorder with Tempen • Writes without ink, using electrically-heated styluses. Simultaneously records "when," "how long" and "how many" on as many as 20 channels. Applications: productive and non-productive time of any or all machines in a plant, circuit breaker action, qualitative analysis, missile performance.

d New Expanded Scale Voltmeter • Provides increased readability of voltage records as upper ¼ of voltage range is expanded to fill upper 80% of chart span. Applications: checking voltage regulation, voltage records, trouble-shooting.

Standing solidly behind the creative designs of our engineering staff are the highly-developed skill and attention to detail of our master craftsmen. At right, M. R. Felske, Master Craftsman at Esterline Angus for 34 years. *For more detailed information on any instrument or its applications, write:* **Esterline Angus Instrument Company, Inc.,** Box 596-B, Indianapolis 6, Indiana.

Excellence in graphic recording for over 50 years—ESTERLINE ANGUS

Makers of instruments to record: MICROAMPERES, DC · MILLIAMPERES, DC · AMPERES, AC AND DC · VOLTS, AC AND DC · WATTS, AC AND DC
KVA, KVAR · VOLTAGE TRANSIENTS, AC · FREQUENCY · POWER FACTOR · EVENTS · SPEED · POSITION · MOTION · PRESSURE · VACUUM

TUF-QUIK FOR *All* FLOORS

Tougher, faster...safer!

TUF-QUIK SKID-GRIP for safe footing on ramps, stair treads and other potentially slippery surfaces (wood-concrete-metal, painted or bare, *indoors and out*). Dries overnight for *heavy* traffic, provides MIM* service with these unique features...

- **READY-MIXED**—brush easily, no abrasive additives needed
- **NON-SPARKING** — safe for use in fire-hazard areas
- **SAFETY-ENGINEERED** — 85-90% coefficient of friction on wet or oily floors
- **CHEMICAL-RESISTANT** — rubber-alkyd-epoxy base withstands repeated spillage of fuel or lubricating oils, fats, greases, gasoline, many other solvents, chemicals

For general floor service use TUF-QUIK FLOOR ENAMELS — companion MIM* products.

***MINIMUM-INTERRUPTION-MAINTENANCE** — the concept of specialized coatings which perform unusual services *quickly*, with minimum shut-down of plant operation. **Write for Bulletin P-57 with full data.**

Creators of Advanced Coatings for Industry

THE WILBUR & WILLIAMS CO., INC.

Factory and General Offices, 651 Pleasant St., Norwood, Mass.

In Canada — 7920 16th Ave., Ville St. Michel, Montreal 38, P.Q.

Begins on page 124

EQUIPMENT NEWS

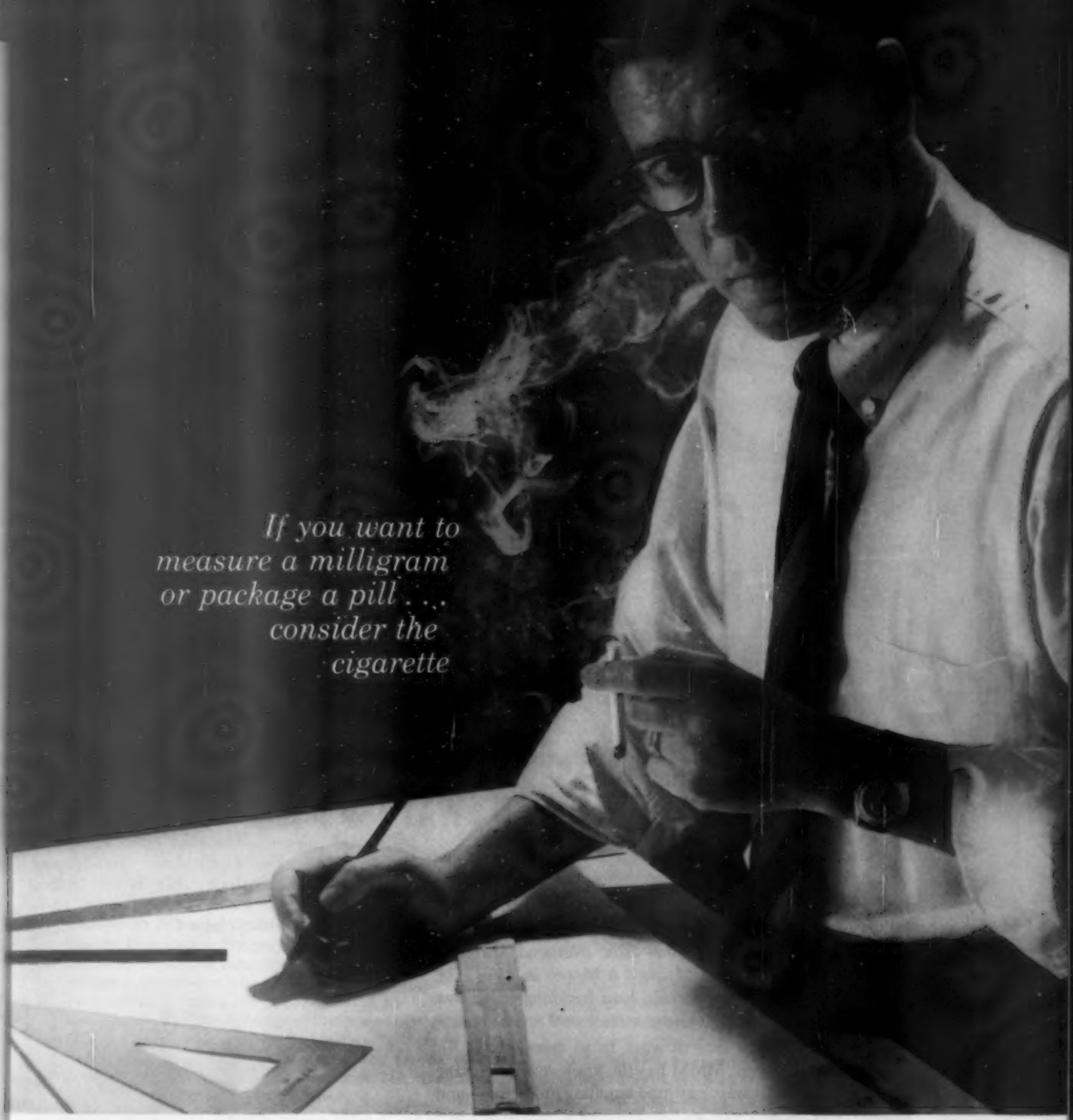
For more data, circle item numbers you want on Reader Service Card.

131—Automatic cleaning for power boiler tubes removes soot and scale with electrically operated punching brush that feeds into tube. No need to shut down boiler. Eliminates fatiguing and time-consuming hand cleaning. Operates from within 3 ft. of wall. *Power Tube Inc.*

132—T-square and ruler combination can be used to draw evenly spaced vertical and horizontal lines and circles. Built-in roller moves up and down easily to draw lines. Index window shows 1/16-in. distance between lines. Makes up to 22-in. diameter circles, arcs. *Rol-Ruler Co.*

133—Plasma gun sprays coatings, including refractories, with controlled thickness and density and extreme bond strength. High-speed coating; saves up to 30% over existing processes. Compact and lightweight; powder feed controls are electromechanical. *Avco Corp.*

Turn the page



An industry that produces and packages over 510 billion units a year obviously demands machinery of highly specialized capability.

This is the tobacco industry—and we at American Machine & Foundry Company are proud of our more than sixty years of leadership in developing the machines that help make this tremendous production possible.

But it occurs to us that these machines, with modification, may hold the solution to problems in many other industries, as well. A maker of a small packaged product, like a soap or a pharmaceutical, where accurate weight can mean the difference between profit and loss—or a manufacturer of a packed and cartoned product, may be interested in a packing machine that might be adapted to his product. A processor of a large, loose raw material may be interested in how AMF developed tobacco leaf handling and processing systems—and want to apply the same know-how to wasteful, uneconomic hand operations. The use of electronics in the control of high-speed inspection, correction and packaging may interest still another industry.

We, of course, do not know your particular problem. But our AMF research and development teams, involving highly skilled engineers, technicians and scientists throughout the world, may help you find the answer.

Tell us *your* problem. There is no obligation and your inquiry will be treated in strict confidence.

TOBACCO MACHINERY GROUP Dept. F

AMERICAN MACHINE & FOUNDRY COMPANY

EXECUTIVE OFFICES: AMF Building, 261 Madison Avenue, New York 16, New York

Bologna · Frankfurt · Geneva · London · Mexico City · Paris
San Juan · Sao Paulo · Stockholm · Sydney · Tokyo · Vienna

WHAT IS A CRANE FOR, ANYWAY?

To handle I-beams. Or castings or machinery or ingots or tanks. Or any of a thousand other things. But mostly to help keep production costs down and profits up.

Products of production in countless variety are handled safely and efficiently by Shaw-Box overhead traveling cranes. Built by Manning, Maxwell & Moore in every type and capacity needed for specific load handling jobs, they help all kinds of businesses save money and make money.

Shaw-Box cranes are seen at work in so many places for other sensible reasons. MMM has the know-how and crane building facilities to solve any load handling problem — and pioneered many innovations that are now standard practice in the crane industry. Today Shaw-Box cranes with pre-engineered and standardized components are a revelation in low first cost and upkeep. And, they have structural and functional plus values that add even more in long-term economy.

Whatever your plans call for in a crane, you will find it well worth knowing all the plus values Shaw-Box cranes have to offer. We invite your inquiry.

MAXWELL MANNING MM & MOORE INC. TRADE MARK

SHAW-BOX® CRANES

A product of

MANNING, MAXWELL & MOORE, INC.

Crane & Hoist Division • Muskegon, Michigan

Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

134—Dunnage bag, of rubberized fabric, inflates for insertion between sections of heavy but fragile loads to cushion against costly damage. Sqair Pak replaces expensive wood and strapping. Re-usable; 24 to 48 in. wide; 60 to 108 in. long. *B. F. Goodrich Co.*

135—Electron tubes for industrial test equipment, instrumentation, amplifiers, etc., use durable internal construction for low noise and microphonics. Gold-plated contact pins won't corrode. Six types replace several widely used 6- and 12-v. tubes. *Raytheon Co.*

136—Variable speed controls, for d-c motors from ½₂ to 3 hp., are now available in 15 standard "off-the-shelf" models. Control speeds from 0 to maximum motor rpm. in either direction. Operate on single-phase 115 or 230 v. a-c. *Pacific Industrial Controls, Inc.*

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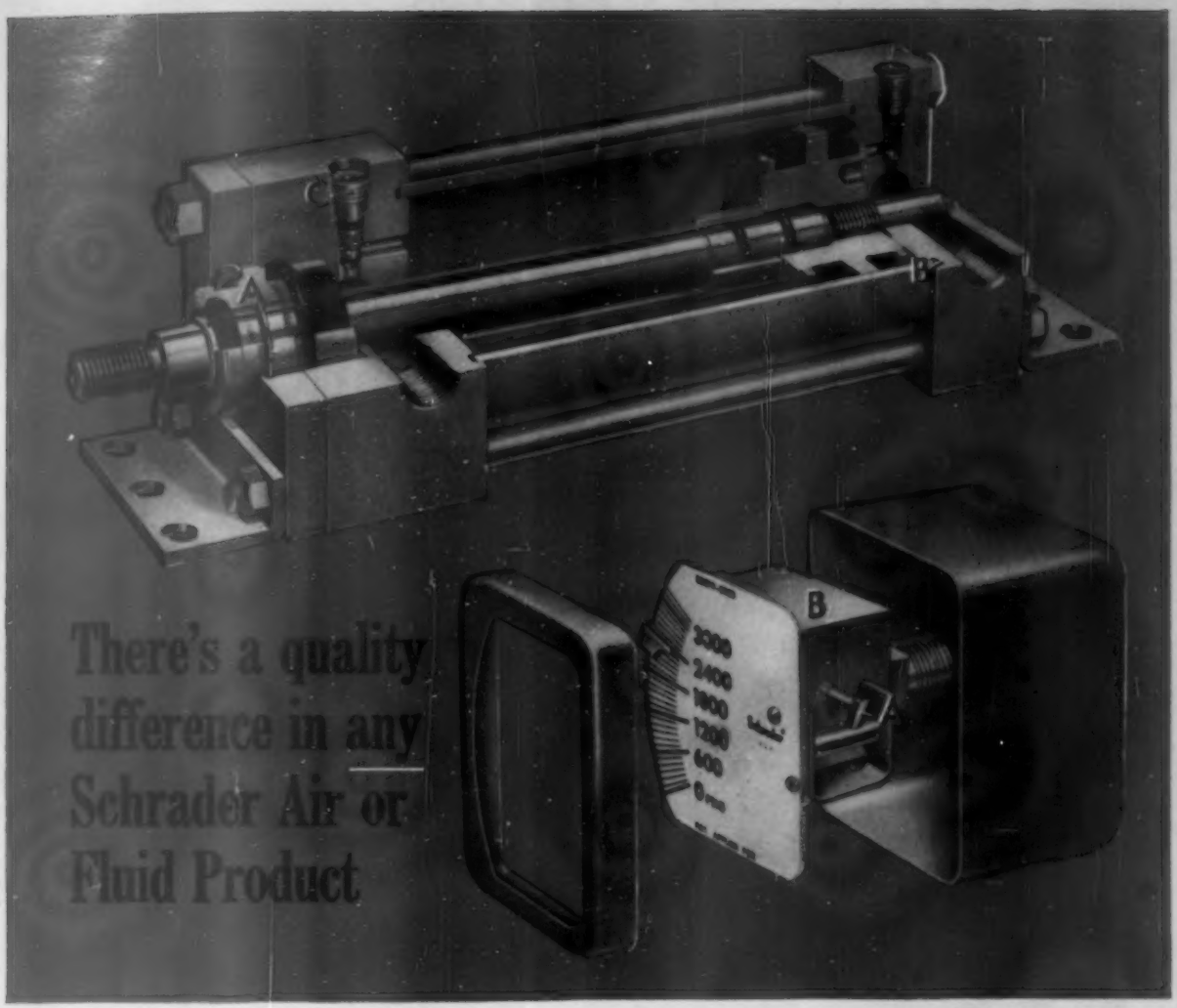


EXAMPLE: Schrader Square-end Cylinders not only have quality built into every part, but feature many extras. For instance, the unique cartridge-type bronze bearing assembly (A) is easily removed by releasing just one retaining ring—no need to dismantle the entire cylinder for bearing maintenance. Special "step" design cylinder seal (B) assures perfect alignment and positive seal without danger of gasket damage. Below surface cushion adjusting screws (C) are protected from damage but fully accessible. They lock to eliminate loosening due to vibration.

Interchangeable with all JIC cylinders, Schrader also provides a variety of mountings. Special bushings are available for bone-dry piston rod in hydraulic operation.

ANOTHER EXAMPLE: Schrader's new direct action Hydraulic Gauges without mechanical linkage (A) eliminate fatigue failure of internal parts. They can withstand 100% overload without damage to accuracy, and are triple-damped (B) to eliminate indicator oscillation from pump pulses, surges, or shock that would damage other types. Can be maintained and calibrated easily in the field. PSI pressure ranges 0-500, -1500, -3000, and -5000.

This new Schrader catalog is available at your Schrader distributor, who is stocked with the complete range of sizes and types of Schrader air circuitry products. Consult the Yellow Pages or write Schrader.

FULL LINES OF QUALITY AIR CIRCUIT COMPONENTS • OFF-THE-SHELF SERVICE AND INFORMATION FROM YOUR NEARBY DISTRIBUTOR • STAFFED WITH AIR CIRCUIT EXPERTS • CONSULT YELLOW PAGES OR WRITE FOR HIS ADDRESS

Schrader®
a division of SCOVILL

A. SCHRADER'S SON
Division of Scovill Manufacturing Co., Inc.
457 Vanderbilt Ave., Brooklyn 38, N. Y.

QUALITY AIR CONTROL PRODUCTS

For more facts Circle 481 on Reader Service Card

Purchasing Agent, "... purchasing fewer types of lubricants in greater volume lowers our costs."

Superintendent, "... simplifying anything, including lubric tion, pays off in improved efficiency."

GULF MAKES THINGS RUN BETTER

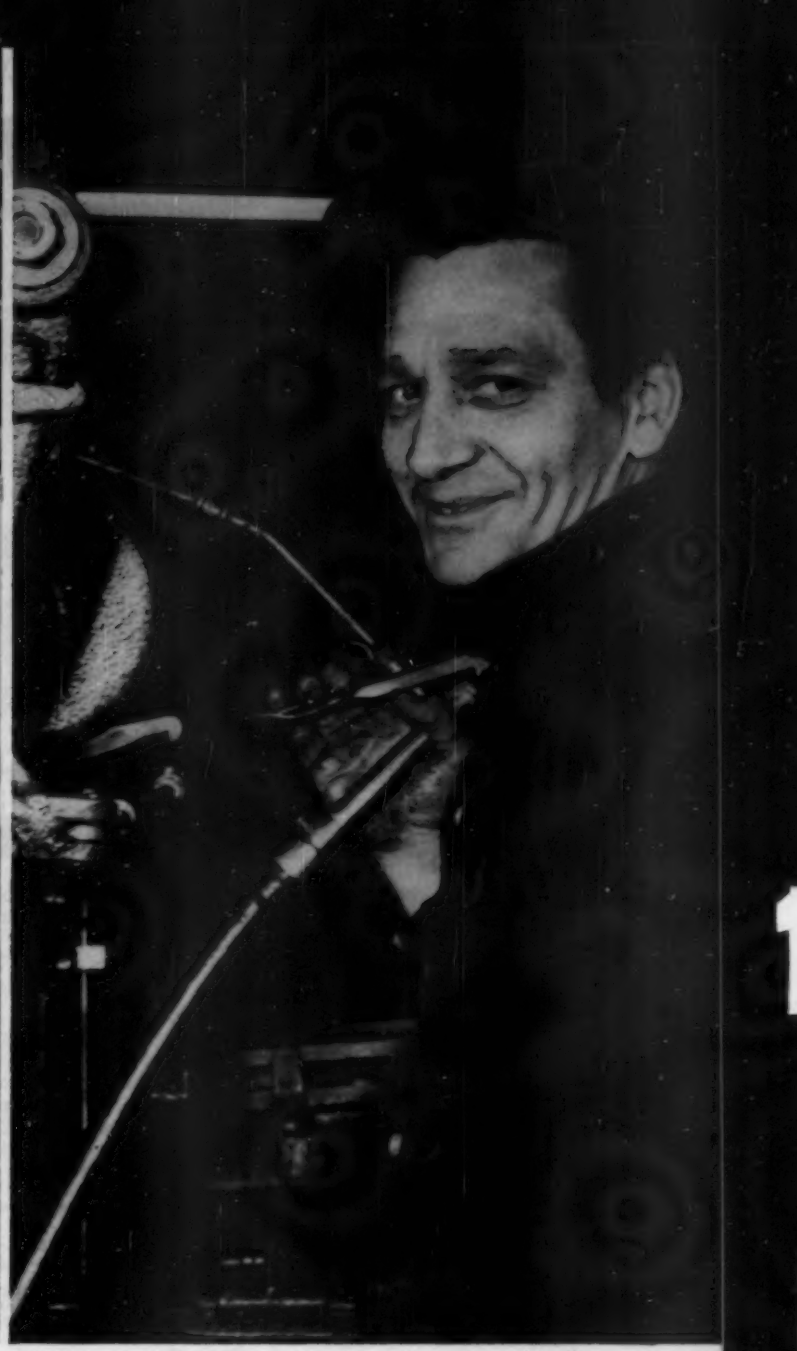
These four men understand the real value of a simplified lubrication program. *Why?* Because a minimum number of lubricants makes their jobs a lot easier.

In some plants, Gulf engineers have found more than *three* times the number of lubes actually needed for efficient operation. This means three times as many ordering, billing, stocking and handling problems. And it also means three times as many chances for human errors.

Examples: One large electrical appliance manu facturer slashed lubricants from dozens to just 6. I addition, a well-known paper company pared lub brands from 39 to 13.

Here's what Gulf engineers can do for you: (1 they can relate their experiences with hundreds o lubricating problems to *your* specific needs, an (2) they can recommend these versatile Gulf® lubr cants—Gulf Harmony® Oil, Gulfcrown® Grea

Plant Engineer, ". . . a simplified lube inventory means reduced paperwork, fewer handling and stocking problems."



Oiler, ". . . fewer lubes mean less chance for error, and I get the job done faster."

ER THROUGH SIMPLIFIED LUBRICATION

and Gulf E.P. Lubricants.

Perhaps there are opportunities in *your* plant for simplified lubrication. A Gulf Sales Engineer is available to help you find them. Contact him at your nearest Gulf office. Or, write today for pamphlets on Gulf multipurpose lubes.

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Building
Houston 2, Texas

Send me booklets on Gulf multipurpose lubricants.

Name_____

Company_____

Title_____

City_____ Zone____ State_____

For more facts Circle 482 on Reader Service Card

YOUR UNISORB DISTRIBUTOR

Can help your machines get a More Productive Foothold!

Do you have any of these problems: Big press or other machine to relocate quickly, inexpensively? Prevention of transmitted vibration . . . induced vibration? Irregular plant floors?

If so, call in the Unisorb distributor. He knows Unisorb mounts can cut machine installation time up to 80% . . . prevent up to 85% transmitted vibration . . . control induced vibration . . . level machines quickly . . . muffle noise.

He knows Unisorb-mounted machines produce more efficiently. Equipment can run at higher speeds — production increases. Workers do a better job, are less fatigued when noise is controlled.

Machine alignment is improved, too: fewer replacement parts are necessary, tolerances are easier to hold. Maintenance of structures is lowered, floors are not damaged by drilling (no lag bolts nor screws are needed).

ASK YOUR DISTRIBUTOR ABOUT

UNISORB PADS
The basic vibration control unit. Many densities, thicknesses. Have successfully mounted machines up to 275,000 pounds.

UNISORB LEVEL-RITE "200" and "500"
Support maximum loads of up to 750 lbs. per unit. Low cost, precise leveling and vibration control for light and medium-duty machines.

UNISORB LEVEL-RITE
Universal self contained leveling device for all types of machines. Available in a family of products to support maximum loads of up to 7500 lbs. per unit. Fast, easy, precise leveling. Available with exclusive screw-post design or as a basic mounting plate for built-in leveling devices.

SEND FOR FREE SAMPLE AND NAME OF DISTRIBUTOR NEAREST YOU

UNISORB

Division of The FELTERS Company
UNISORB 206 SOUTH STREET, BOSTON 11, MASSACHUSETTS

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

137—Elapsed time recorder automatically computes and prints on cards time required to do job. Gets cards ready for auditing and payroll processing—needs no arithmetical calculations. Allows for lunch or rest periods. Wall- or table-mounted. *Cincinnati Time Recorder Co.*

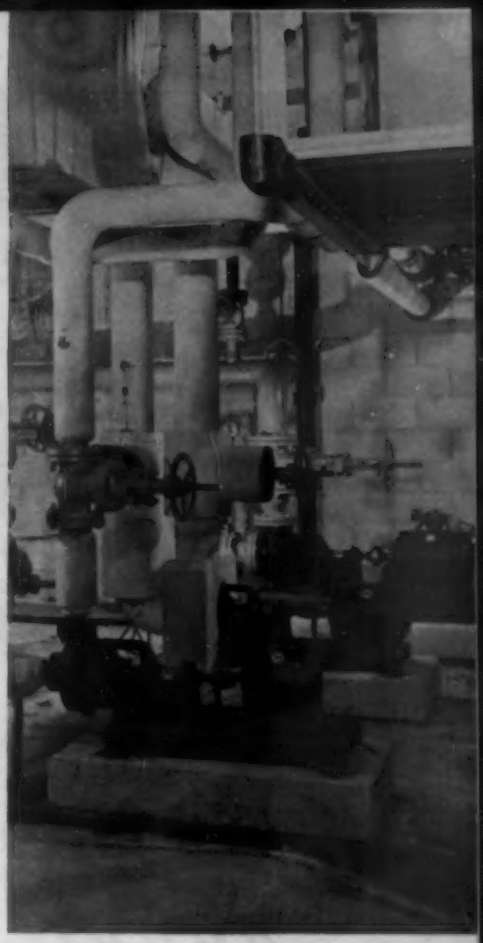
138—Paint filter pad of glass fiber is more efficient than paper type. One 2-in. pad does work of two 2-in. pads commonly used. Highly absorbent, little resistance to air flow. Fits standard holding frames; needs no grids or other accessories. *American Air Filter Co.*

139—Vertical carton elevator, capacity to 350 lb., lifts boxes from one floor level to another. Stacks automatically fed cartons. Compression assures closure for cases ejected by sealer. Handles various carton sizes and up to 20 cartons/min. *Lathrop-Paulson Co.*

Turn the page

ideas and news

New era of quiet in cooling: Smooth-running Allis-Chalmers pumps and motors "speak" with a whisper . . . circulate chilled water silently for air conditioning hospitals, schools, shopping centers or office buildings. Quiet operation is a result of the extra attention to detail given in manufacturing and testing. One example is the sound analysis laboratory where exact sources of unwanted vibration can be pinpointed, new design concepts developed.



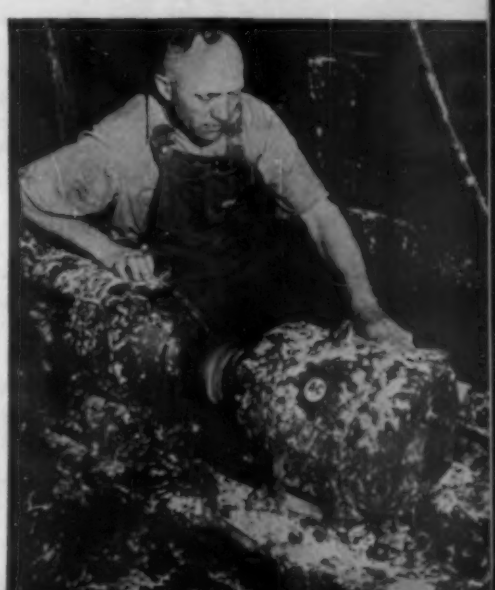
More air . . . less wear with vibration-free compressor: RO-FLO compressors with sliding-vane rotary design eliminate efficiency loss inherent in reciprocating-type machines. Centrifugal force keeps vanes in close contact with cylinder walls, automatically compensating for wear. Rotary action reduces the number of wearing parts to three . . . blades, bearings and seals . . . maintenance is minimized. You get many other advantages with this rotary compressor from A-C. Compact design minimizes floor-space needs. Lack of vibration simplifies foundation needs and gives you pulsation-free air. Operation is so smooth you can stand a coin on edge atop a RO-FLO compressor operating at full speed. For constant, dependable operation, choose the RO-FLO compressor. Single-stage units are available for pressures to 50 pounds gauge. Two-stage units to 125 psig.

No bake-out for wet motor: This SUPER-SEAL motor, installed in a low-lying work room of a Connecticut paper mill, has repeatedly been under 5 to 6 feet of water. When the flood water recedes, the motor goes back into service without costly, time-consuming "bake-out." POXEAL and SILCO-FLEX insulations, used in SUPER-SEAL motors, are impervious to moisture, dust, dirt, oils and most acids and alkalies.

To put productive ideas like these to work . . . see your Allis-Chalmers distributor

Silent pumps for air conditioning . . . motors that shrug off floods . . . compressors that defy wear. These examples demonstrate the extra value that is standard with A-C . . . the greater efficiency and added productivity which are yours when you buy A-C products, systems and services. Call your nearby Allis-Chalmers distributor for details on A-C "worth-more" features. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Some franchises are available for A-C compressors, motors, control and pumps.



ALLIS-CHALMERS PRODUCTS FOR INDUSTRY: compressors, controls, coolers, crushers, earth-moving equipment, engines, generators, industrial systems, kilns, lift trucks, mills, motors, pumps, rectifiers, screens, switchgear; thermal, hydro and atomic electrical generating equipment; transformers, unit substations.

Ro-Flo, Poxeal, Silco-Flex and Super-Seal are Allis-Chalmers trademarks. A-1498

ALLIS-CHALMERS

Purchase order follow up is simplified when you can scan at the rate of

10,000 cards per hour.

"Management by exception" is the desired method of following-up purchase orders.

VISIrecord's speed and visibility, to thousands of records at finger-tip control, provides instant information on hundreds of variable factors.

Improper situations show up at a glance — no matter how large the number of orders involved, and permit telephonic action in seconds.

VISIrecord provides split-second speed in management control, in minimum space requirements with normal seated desk level operation.

VISIrecord is equally proficient on machine or hand posted operations — Accounts Receivable, Inventory or Maintenance Control — Edge punched card to tape or Order Writing and hundreds of other systems — anywhere records must be kept and used quickly and accurately.

Your VISIrecord Systems Specialist is ready and able to provide proof of related accomplishments achieved by thousands of satisfied customers.

Meanwhile write for Case Histories and list of satisfied companies in your industry.

VISIrecord, inc.

375 PARK AVENUE, NEW YORK 22, N. Y.

VISIrecord

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Systems Specialists in Principal Cities

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card

140—Knock-down safety ladder can be assembled quickly with wrench and screwdriver. Steel components include two welded side frames and reinforced metal steps. Rolls on casters. In 20 models, from 2 to 7 steps, to 66½ in. high and 25½ in. wide. *Patent Scaffolding Co.*

141—Dual-purpose scale, for direct weighing or ratio counting, handles materials to 40 lb., and from 2500 to 10,000 small parts. Front-mounted lever converts scale from weighing to ratio counting. Four direct-reading charts and standard ratios. *Pennsylvania Scale Co.*

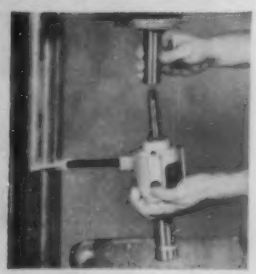
142—Diesel-electric fork truck, with 40,000 lb. capacity, has no clutch, transmission, drive shaft or hydraulic lines. For use on paved or unpaved surfaces. Three-wheeler is powered by 210 engine-driving a-c and d-c generators. Simple switch control. *R. G. LeTourneau, Inc.*

Turn the page

AISLE MARKER conveniently dispenses
Permacel colored vinyl tape.
Abrasion-resistant tape is
waterproof, washable, more durable
than paint. Adheres firmly to
any floor surface.
Available in six colors.
PERMACEL®
NEW BRUNSWICK, NEW JERSEY • TAPES • ELECTRICAL INSULATING MATERIALS • ADHESIVES

iT'S A FACT!

You can tap 1/2" holes with a light drill press and Supreme's New VersaTAPPER



Shaft of Model 6100 is held in drill press chuck. No. 6200 (above) has Tapered spindle.

Supreme Accutap Chuck is standard equipment with VersaTAPPER. Capacity 0-½"

VersaTAPPER is a compact precision-made tapping unit. Fits any drill press . . . features half-inch capacity range plus 4-time increase in torque. Easy to install. Simple and quick to remove after use.

VersaTAPPER...
operates easily in any material
...with widest capacity range
...yet costs far less

JUST $63 COMPLETE

The *new* VersaTAPPER has scored an instant success with production people everywhere. It has more versatility than other tapping devices. It has the *widest capacity range*—from 0 to ½", but depending on application, use of taps smaller than No. 10 is limited. It develops *more power*—makes the tapping of ½"-13 holes a simpler matter, even with light duty drill presses. VersaTAPPER is *simple to use*—can be successfully operated by anyone in your shop.

All of these features at the remarkably low price of $63.00 complete marks VersaTAPPER as a product you must see at the first opportunity. It's available at your local Supreme Chuck distributor. Call him soon.

You get more from power tools with Top Quality Supreme Accessories

Supreme Brand Chucks

Noted for unmatched quality. The widest range of sizes and types...one for every machine in your shop. Exclusive Supreme hardening means greater accuracy—longer wear.

Supreme Versamatic

Reversible speed reducer for portable drills. Fits all makes—permits their use for power screw driving, nut running and heavy duty drilling. 7 to 1 reduction means high torque increase. *A fine tool.*

Supreme Push-Pull Tapper

Like the Versamatic, but made for the single purpose of tapping with portable drills. Reverses instantly for tap removal. Handles taps up to 5/16" diameter. Top quality. Simple to operate.

SUPREME PRODUCTS ARE IN STOCK IN YOUR CITY. CALL YOUR DISTRIBUTOR

PRECISION ASR PRODUCTS FACTORY

Supreme
PRODUCTS CORPORATION
2222 S. CALUMET AVENUE • CHICAGO 16, ILLINOIS

For more facts Circle 487 on Reader Service Card

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card.

143—Low-pressure filters, for hydraulic, air, and oil systems, are rated 150 psi., at 100 F. Choice of three elements to filter from 2 to 100 microns. In 3 sizes for 30, 60 and 90 gpm. flow. Easy-to-service V-band clamp permits fast disassembly. *Bendix Corp.*

144—Trouble light, with 36-ft. cord and transformer, produces 65,000 candlepower. Jetlite is safe around volatile fluids and explosives. Lamp bulb is protected by 3/16-in. safety-glass plate. Lamp is sealed in vulcanized rubber against liquids and gases. *Burton Mfg. Co.*

145—Dust-free work station has internal silent exhaust system that picks up dust and fumes at point of work. Replaceable filter traps particles, exhausting fresh air. No external duct is needed. Self-contained unit has twin lights, Plexiglas eye-shield. *Craftools, Inc.*

146—Air vacuum cleaner picks up over 55 gal. of liquids in 55 sec. Cleans out sumps, pits, spills. Moves sludge where other vacuums fail. No electric motor or moving parts. Drum can be changed in seconds. Uses up to 3-in. ID hose. *American Cleaning Equipment Corp.*

Turn the page

WE LIKE SPECIAL BRUSHING PROBLEMS TOO!

Though we recognize the need for brushes like this, we channel our abilities and know-how in the direction of overcoming your industrial brushing problems. It is not just one man at Newark Brush, but the entire engineering staff that goes to work. It is an organization task requiring an unusual combination of skills — plus a wide knowledge of industry's problems — that have produced for so many exactly the right brush for the job. We invite your inquiry at all times.

SINCE NEWARK 1894

Leadership Proved Through Performance!

59-93

NEWARK BRUSH COMPANY

260 MICHIGAN AVE., KENILWORTH, N. J.

For more facts Circle 488 on Reader Service Card

2-A, 16-B:C
10-POUND

3-A, 20-B:C
20-POUND

NEW KIDDE TRI-CLASS-ABC UNITS APPROVED FOR A, B, C, FIRES!

U.L.-approved for use on all three classes of ordinary combustibles, flammable liquids, and electrical fires, new 10 and 20-pound Kidde dry chemical portables now simplify the job of fire-fighting, eliminate the possibility of error in matching the extinguisher to the fire hazard. Both make the job of training personnel easier, since they feature simple, two-step operation. Just aim, and pull the trigger . . . fire is smothered in seconds.

Tops in performance and quality, pressurized Kidde Tri-Class-ABC 10 and 20-pound portables release a powerful, non-turbulent dry chemical stream to insure dependable, fast-acting fire protection. Simple recharging means that once used, your units are quickly put back in service. In addition to full U.L. approval, both units are approved by Factory Mutual Laboratories. For more information on these easy-to-use portables, write to Kidde today!

Kidde

Industrial and Marine Division

Walter Kidde & Company, Inc., 1032 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd., Montreal — Toronto — Vancouver

Begins on page 124

EQUIPMENT NEWS

For more data, circle item numbers you want on Reader Service Card

147—Hydraulic line filter has built-in pressure gauge to show when filter needs to be cleaned or replaced. Half-gallon filter has 1¼-in. NPTF ports at inlet and outlet. Choice of disposable or re-usable element. Operates at 100 psi., −65 to +300 F. *Gresen Mfg. Co.*

148—Foam-inhibiting pouch prevents build-up of foam inside wet pick-up vacuum cleaners. Low-cost unit consists of chemical enclosed in screen pouch. Attaches easily to intake deflector of all cleaners. Action starts when scrub water enters tank. *Multi-Clean Products, Inc.*

149—Dry cleaning machine gets white room clothing and accessories super clean. Traps particles up to 10 millionths of an inch which pass through conventional cleaning equipment. Provides continuous solvent filtration and absolute filtered air. *Hoffman International Corp.*

Turn to page 164

Structurally efficient!

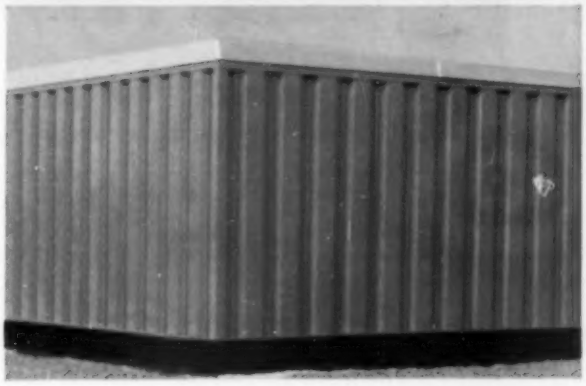
EGSCO® insulated metal wall panels in Colorgard are architecturally effective for all building types

Whether the building design is industrial, institutional or commercial, the EGSCO system of interlocking metal wall panels offers simple, low cost and fast erection, ample insulation, pleasing wall configuration and built-in contemporary color finish.

For most modern buildings the extreme panel lengths available eliminate unsightly horizontal panel laps. Fasteners are exposed to neither view nor weather. This, coupled with factory caulking of vertical joints, eliminates any weak point of entry for weather corrosion.

The shimmering beauty of Colorgard is protected by Peelcote, a strippable polyethylene skin, until erection is complete.

EGSCO engineers provide the architect and engineer with structural standards to reduce drawing board time. Specify EGSCO for a sure bet. For complete information see Sweet's File 3a/Sm or write for Bulletin 61W.



(top) EGSCO insulated wall panels with Colorgard in tan and gold were erected on this recently completed Williamsport, Pa., plant of The M. W. Kellogg Company, where the Power Piping Division is located, including engineering, research and field erection and the manufacture of power piping systems. Engineer and architect is Lester B. Knight and Associates, Inc., Chicago.

(middle) This is the new, modern Pittsburgh office of Carson, Pirie, Scott & Co., nationally known wholesale distributors of floor coverings. The architecture is enhanced by EGSCO Shadowall panels in Colorgard Gold. The architect is J. Kenneth Myers; the contracting engineers are Mellon-Stuart Co., both of Pittsburgh.

(lower) A close-up view of a curtainwall of EGSCO Contourwall in Colorgard Green. The panels form the colorful insulated metal wall for a penthouse on the roof of a modern factory-type building.

ELWIN G. SMITH & CO., INC.

Manufacturers of EGSCO® Metal Wall Products

Pittsburgh 2, Pa.

BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DETROIT
TOLEDO • NEW YORK • PHILADELPHIA • PITTSBURGH

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY....

Pat. No. 2,900,096

DEMPSTER-DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

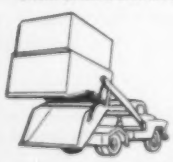
In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

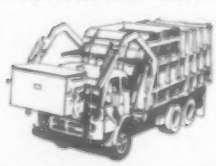
Dept. F-10 DEMPSTER BROTHERS Knoxville 17, Tenn. Inc.

IN ALL LEADING CITIES FROM COAST TO COAST

DEMPSTER-DUMPSTER



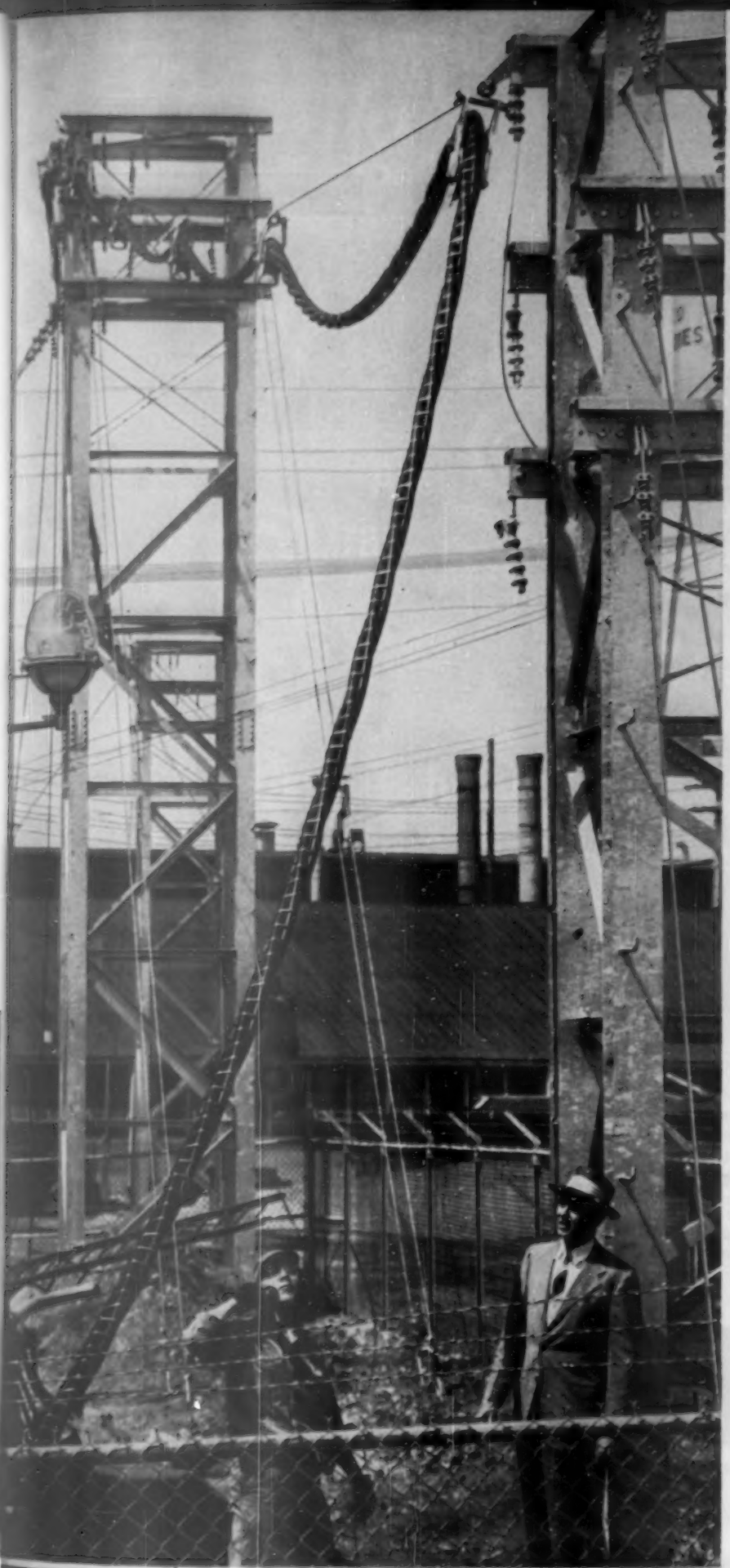
DEMPSTER-DUMPMASTER



DEMPSTER COMPACTION TRAILER

DEMPSTER DUMPMASTER®

EQUIPPED PRIVATE HAULERS



GO UP TO BRING COSTS DOWN WITH ANACONDA AERIAL CABLE

Anaconda's compact, self-supporting factory pre-assembled aerial cable is installed as a *single unit*. No field assembly is required—and no lashing operation. In plants where the maze of pipes and other underground structures often make installation of ducts or buried cable costly or difficult, this cable solves the problem.

It's fast, easy to install—particularly in crowded areas. You need only one assembly even for three-phase circuits. No special ducts, crossarms, or insulators are required.

You can attach Anaconda aerial cable directly to a pole or building-attached bracket.

Type AB butyl insulation and Neoprene jacket affords resistance to moisture and heat. For the full story, call the Man from Anaconda today. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York; Department EFL-1-F. 61262

ASK THE MAN FROM

ANACONDA®

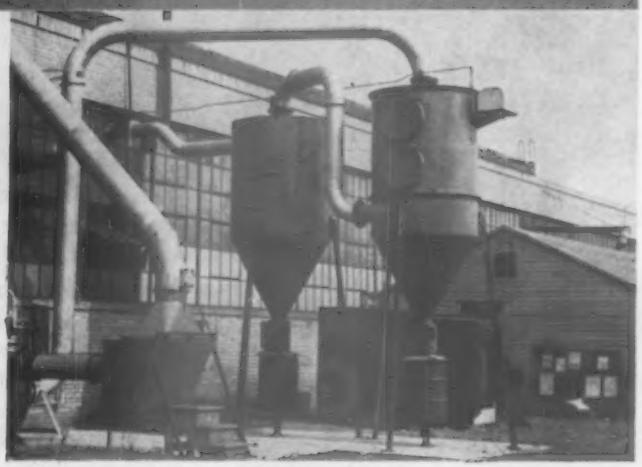
FOR SELF-SUPPORTING AERIAL CABLE

Circle 492 on Reader Service Card

CONTROLLING BERYLLIUM DUST

. . . Another Tough Task Made Easier and Safer by

SPENCER VACUUM



The Bendix Corporation, Eclipse-Pioneer Division

Toxic nature of its dust makes beryllium a "problem" metal to machine. But not here!
Spencer vacuum, piped into a specially designed "clean room", picks up the dust right at the machines . . . whisks it away to filter-equipped separators outside the building.
Result: machining is quicker, safer, easier.

Request Catalog No. 155B, "Spencer Vacuum", or write for recommendations on your particular problem.

Also manufacturers of portable vacuum cleaners and pneumatic conveying systems.

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

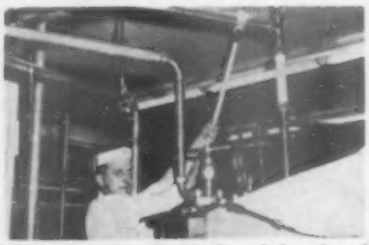
Begins on page 124

EQUIPMENT NEWS

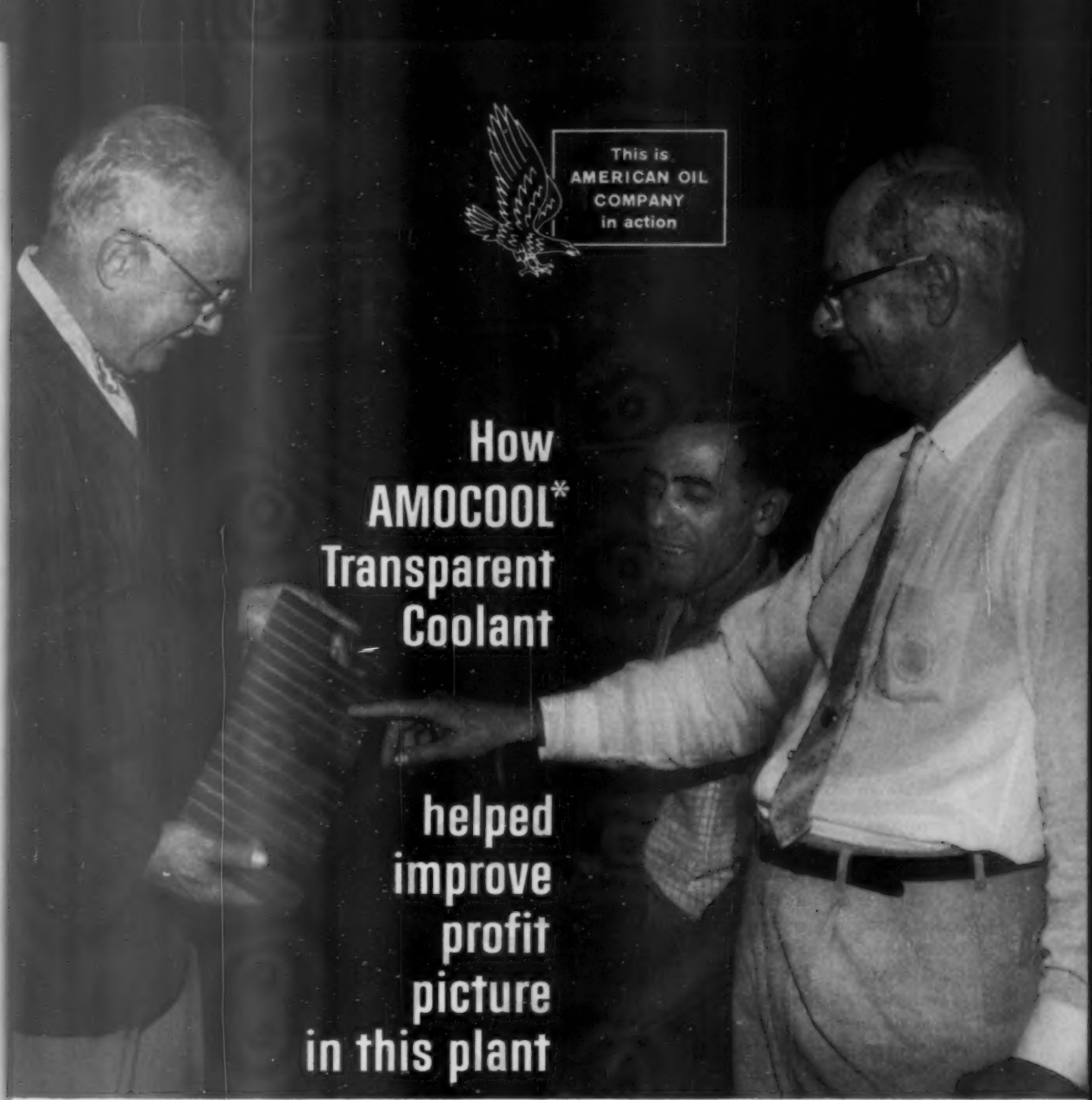
For more data, circle item numbers you want on Reader Service Card

150—Stand-by power supply kicks in instantly when line power fails. Provides precisely controlled 60 cps. System includes static charger and battery combined with inverter chassis. Easy to connect to a-c system. Single phase, 115 v., 2.5 kva. *Thompson Ramo Wooldridge Inc.*

151—Impulse counter registers 100 counts per second, is guaranteed for 500 million counts. Eliminates conversions—measures time and distance in decimals. Five- or six-figure drum can be operated with electromagnetic or mechanical zero reset. *Ringsdorff Carbon Corp.*



152—Overhead pipe brush has head that slips around pipe with simple twist to permit cleaning from floor. Its 36-in. handle, or any handle length on order, eliminates ladder climbing. For wet or dry cleaning; in two sizes for pipes to 2 in. and 3 in. *Sparta Brush Co.*



Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Sam Vineh, operator, looks on.

by PAUL E. "PAPPY" STRATTON

About the Author.

"Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

☆ ☆ ☆

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding and drilling equipment has been converted to AMOCOOL Transparent Coolant.

☆ ☆ ☆

Would you like this kind of technical help to assist you in improving profits? Get it by calling the American Oil Company office nearest you.

*Trademark

AMERICAN OIL COMPANY

AMERICAN

910 SOUTH MICHIGAN AVENUE
CHICAGO 80, ILLINOIS

For more facts Circle 494 on Reader Service Card

new electronic order processing drastically reduces your electrical apparatus renewal parts inventory

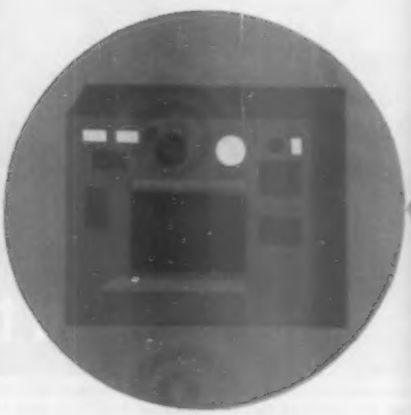
1

Customer phones or mails his order for renewal parts to his local Westinghouse sales office.

3

A computer in the Pittsburgh order processing center determines that the order can be filled from the Westinghouse warehouse which regularly serves the customer and transmits the required information to that warehouse. The teletype receiver in that warehouse goes into action and produces all shipping forms.*

*If the nearest warehouse inventory records show insufficient stock, the computer would review—immediately and automatically—the inventory of other nearby warehouses which could ship. Then shipping information would be teletyped to the closest warehouse with stock and shipment would be made from there—all within the same 30 minutes.



J-95221

The new Westinghouse automatic order processing system puts every renewal parts order on the shipping platform . . . on its way to you . . . in 30 minutes.

This fantastically fast, accurate service is made possible by linking the Westinghouse teletype network . . . the world's largest industrial network . . . with an Electronic Data Processing installation in Pittsburgh. This automatic system compresses days into minutes. This new service, coupled with constantly improving rail, truck and air freight schedules, enables you to attain production and inventory efficiencies in your maintenance parts stocks that . . . up to now . . . you could only wish for.

With this new concept in distribution, you can reduce capital investment in renewal parts and help eliminate production downtime.

Take advantage of this exclusive, 30-minute order handling system for all your renewal parts requirements. Call your local Westinghouse sales engineer to place your next order . . . prove to yourself how quickly you can replenish your stocks with Westinghouse quality renewal parts. *You can be sure . . . if it's Westinghouse*

2

A teletype operator in the local Westinghouse office puts the order into code form on a paper tape which transmits it to the order processing center in Pittsburgh.

4

A warehouseman matches the teletyped forms to the proper part in stock and puts the order on the dock for delivery to the customer. An order placed anywhere in the country will be on the shipping dock within 30 minutes after it goes on the tape in Step 2. All paper work will have been done including automatic preparation of invoices for mailing to customer. All inventory records are automatically adjusted, even to ordering more of the item for the warehouse if stocks are low.

Westinghouse

For more facts Circle 495 on Reader Service Card

IDEAS OF THE MONTH

By Lewis K. Urquhart, Consulting Editor, FACTORY

For more data, circle item numbers on Reader Service Card next to back cover.

Brush away your maintenance problems is slogan on "The A to Z of Protective Coatings," a check chart (*Wilbur & Williams*) that will help you select the right materials for those tougher painting jobs. Application and service data include such important details as average cost per square foot. **(236)**

Ready for early 1962: an electrostatic copier (*Smith-Corona Marchant*). It's desk-top size. Copy paper is fed automatically from storage rack inside machine. Copies cost less than 4¢ apiece. **(237)**

Dobie is king-size cleaning pad (*Brillo*). Won't splinter, shred, rust. Can be used with detergent or scouring powder for heavy jobs, or alone for spot clean-ups. Perfect for drinking fountains, hand rails, etc. **(238)**

Case study in job evaluation (*Smyth & Murphy*) describes plan covering 106 non-exempt office and lab employees in Southern plant. Suggests painless way your company might install similar program. **(239)**

Scratch depth gauge (*Bausch & Lomb*) is low-priced, battery-operated portable. For fast, accurate measurement of scratches, grooves, other surface indentations to determine whether they exceed specific limits. **(240)**

Booklet of the Month is "The Use of Epoxies for Industrial Maintenance" (*Union Carbide Plastics*). Covers surface preparation, methods of application in maintenance of floors and walls, repair of equipment, etc. **(241)**

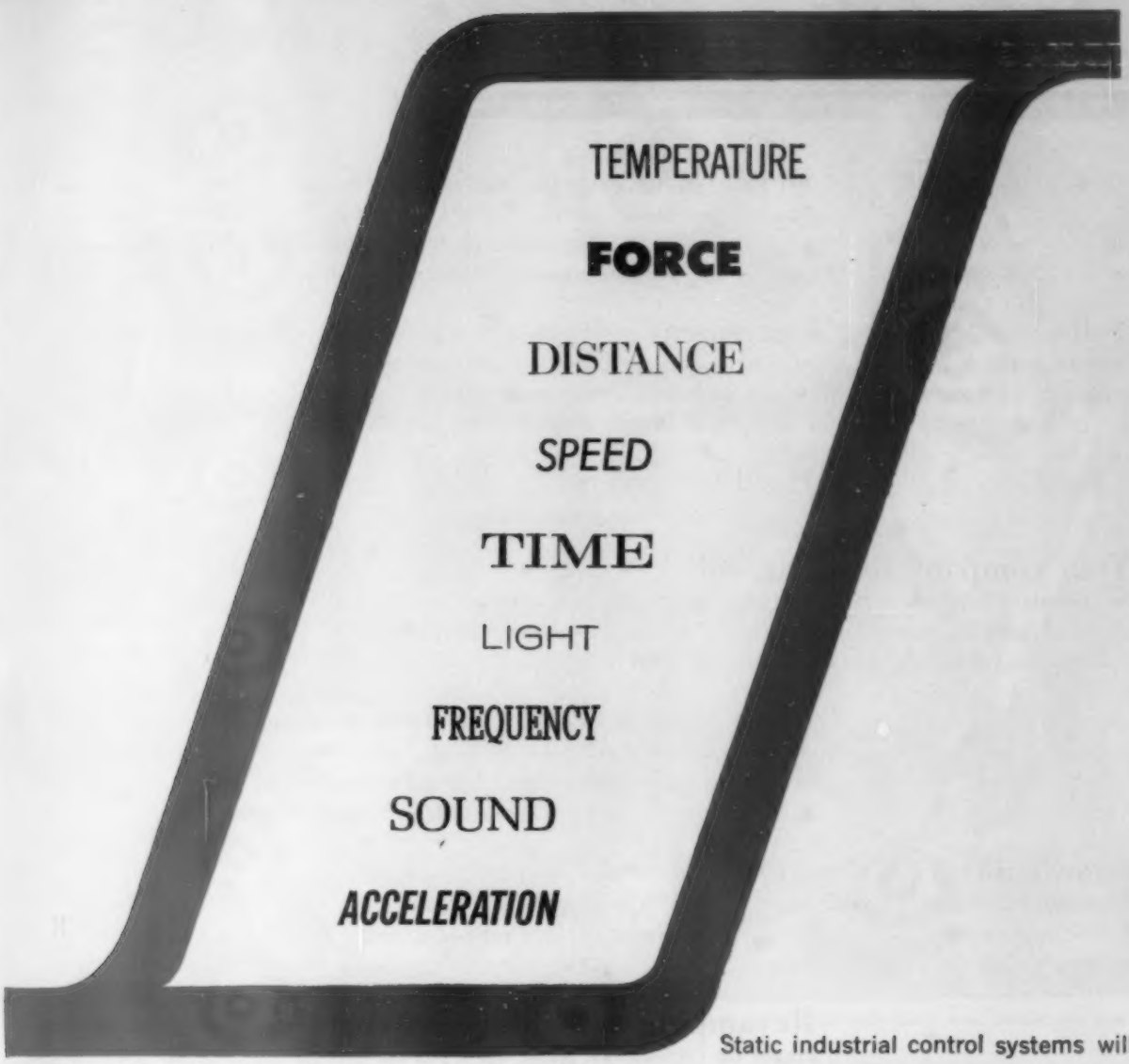
Newest typewriter, christened Selectric (*IBM*), has conventional keyboard but no type bars, no movable carriage. Instead, all characters, numerals, and symbols are contained on sphere-shaped element that moves across paper as it selects and types. Element can be removed by typist and replaced in seconds by another type style. Your choice of six type faces. **(242)**

Write-on/wipe-off magnets (*Rol-a-chart*) are for planners who appreciate convenience and flexibility of magnetic charting and scheduling. Available in many colors, shapes, sizes. Also in flexible strips. **(243)**

Executat is desk thermostat (*Powers*) for handy adjustment of temperatures in executive offices and conference rooms. **(244)**

New Ideas in Materials Management (*Rapistan*) explains "warehousing" approach to handling, illustrates equipment and techniques for storage and transportation of raw materials, finished products. **(245)**

Turn the page



Static industrial control systems will regulate virtually anything that is controllable – and under normal operation these *magnetic* systems will never break down, wear out or need servicing. Temperature (with precision to ±1/4°F at 2200°), position (with logic involving *and, or, not, memory* and *time delay*), speed, force, light, sound, acceleration, frequency, distance, field strength and pressure are but a few. ■ One manufacturer has replaced a vacuum tube-mechanical relay system on his high-speed assembly lines. Reason: it broke down every three weeks. The replacement magnetic static control system has now gone through 26,000,000 consecutive cycles without fault. ■ The symbol above, the magnetic hysteresis loop, , may encompass some of your control problems which are solvable at a lower overall cost. May we discuss this with you? Magnetics Inc., Department F-93, Butler, Pennsylvania.

INDUSTRIAL CONTROL EQUIPMENT

MAGNETICS inc.®

For more facts Circle 496 on Reader Service Card

For more data, circle item numbers on Reader Service Card next to back cover.

Developing competent subordinates (by James Menzies Black) is just one of dozens of publications listed in "Management Bookshelf," 1961-62 catalog of books, periodicals, films (*AMA*) designed to provide practical solutions to general management problems. Want a free copy? **(246)**

Tell your shipping department about Quick-Strip. Non-asphaltic reinforced sealing tape (*Ludlow*) simplifies carton opening (and you know what a job that can be). Secret's in laminant that permits top layer of kraft and reinforcing yarns to separate easily from bottom strip of kraft. **(247)**

Hard-hat wearers should go for goggle clips (*AISE*) in big way. They keep goggles from slipping, whether in raised or lowered position. **(248)**

Your company librarian will be glad to learn—if you're in the metal-working industry, that is—that (s)he can get a complete library of technical papers (*Linde*) on electric welding. Here's an excellent source of information on arc-welding developments. Free, naturally. **(249)**

Treat your secretary (we said last month) to an Adjust-A-Matic, the chair (*Remington Rand*) with the divided seat. Now we add: Treat yourself to an 800 Executive Posture chair. It has five separate adjustments: seat height, tilting tension, backrest height, depth, and tension. **(250)**

Snow's nice on ski slopes. But pain in the neck on factory sidewalks, driveways, parking lots. Easiest way to remove it is to melt it—and did you know cost of operating snow melting system averages only 12¢ per square foot per season? See new brochure (*Revere*) to get facts. **(251)**

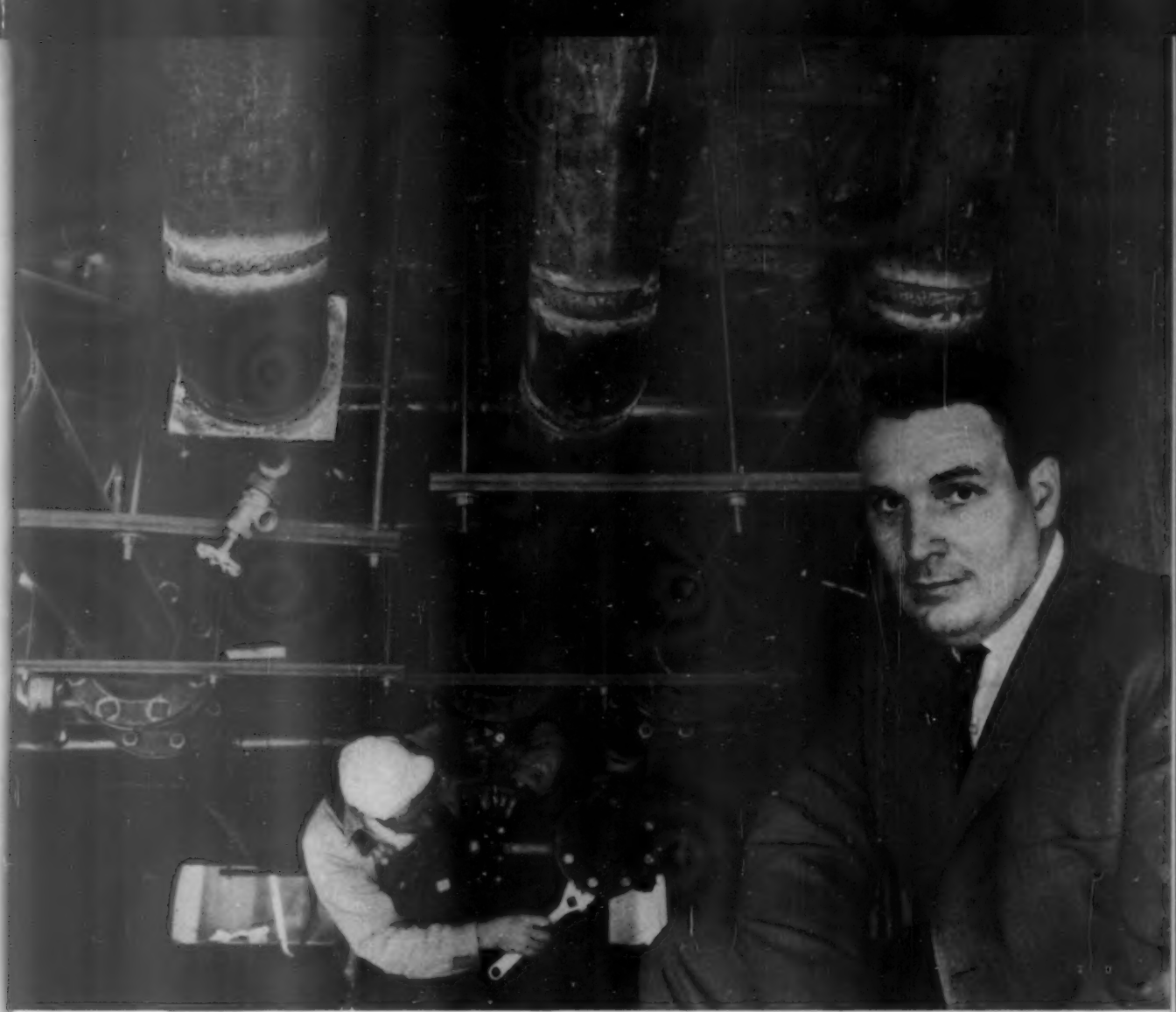
Revamping your filing system? Shelvadrawer is side-opening drawer file (*Wheeldex*). Short, quick pull-out exposes full contents. Two clerks can have simultaneous access to material in same drawer. All-welded units; 3, 5, or 7 levels high; open or completely closed and locked. **(252)**

Wrong stenciling on cartons isn't too much of a calamity when stenciler has quick-drying, spray-packed Blot-o (*Seymour*) at hand. **(253)**

For transmitting food, pharmaceuticals, chemical and petroleum products, etc., Teflon tubing with neoprene cover (*Pennsylvania Fluorocarbon*) combines outstanding properties of former with elasticity, scuff resistance, and thermal protection of latter. Best of all, it won't kink. **(254)**

Making plant layouts is a comparative breeze when layout engineers use self-sticking tapes instead of laboriously drawing partitions, aisles, belt and roller conveyors, overhead monorails, gravity wheel conveyors, etc. Catalog (*ACS*) also shows operation and process-flow symbols, rectangles and circles for organization charts, office templates, printed circuit symbols. **(255)**

Turn the page



Spang Steel Pipe serves the combination heating and cooling system at the deluxe 888 Logan Apartments, Denver, Colorado

"We've been users of SPANG Steel Pipe for 15 years"

—says Mr. Arthur Riley, President, Riley Engineering Corporation, Denver, Colorado

"...and we know SPANG more than amply meets our rigid requirements!"

That's what Mr. Riley told us at the 12-story 888 Logan Apartment Building job site, where he was supervising the installation of over two miles of SPANG Steel Pipe in the combination hot water heating and chilled water cooling system.

"Frankly," says Mr. Riley, "we depend on the quality control exercised in the manufacturing processes of SPANG. Our reputation is at stake on every job, and we depend heavily on the materials used in a project. We know SPANG is among the best pipe available."

In reply to our question about SPANG Pipe's outstanding features, Mr. Riley stated, "SPANG is easy to work with, it has good welding characteristics, its quality is consistent, it's durable, and we get good service."

Get all these advantages from SPANG Steel Pipe on *your* next job. You can't buy a better pipe! Let your local SPANG Distributor serve you soon.

SPANG Steel Pipe is one of the many fine products made by *National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pa.*

Steel's Symbol of strength, long life, and economy

Architects:
W. C. Muchow and Nat S. Sachter, Denver
Consulting Engineer:
Riley Engineering Corporation, Denver
Builder: Al Cohen, Denver
Plumbing Contractor:
John F. McCauley, Denver
Heating and Air Conditioning Contractor:
Louis Cook, Denver
Spang Distributor:
Great Western Pipe Company, Denver

ARMCO National Supply Division

For more facts Circle 497 on Reader Service Card

A simple panel jig allows easy alignment of plywood frames when joining corners. One operator can turn out up to 500 frames in an eight-hour day.

BOSTITCH stapling fastens plywood frames five times faster than former method—saves time, money, and floor space

A luggage manufacturer assembles plywood trunk frames using three to four staples for each corner. Staples are also used to fasten heavy cardboard bottoms of trunk tray units to the frames.

Fastening with Bostitch has proved to be five times faster than the old method. There's no need for stacking and pieces are instantly ready for the next operation. In addition, valuable floor space has been saved.

Your Bostitch Economy Man—one of 350 in 123 U.S. and Canadian cities—can tell you about many other ways to save by fastening with Bostitch. Call him soon. He's listed in your phone book.

Fasten it better and faster with

BOSTITCH

STAPLERS AND STAPLES

610 BRIGGS DRIVE, EAST GREENWICH, R. I.

For more facts Circle 498 on Reader Service Card

For more data, circle item numbers on Reader Service Card next to back cover.

If your lab people don't know all about Lab-Jack (*Cenco*), tell 'em it's mighty handy support for set-ups of expensive glassware, oil baths, etc. Holds 100 lb. without tilting. Elevates continuously to 10½ in. **(256)**

Heat transfer problems? Panelcoil (*Dean*) may be answer. New technical data bulletin full of sketches, photos, tables, graphs will help you determine best kind, shape, size for your heating or cooling applications. **(257)**

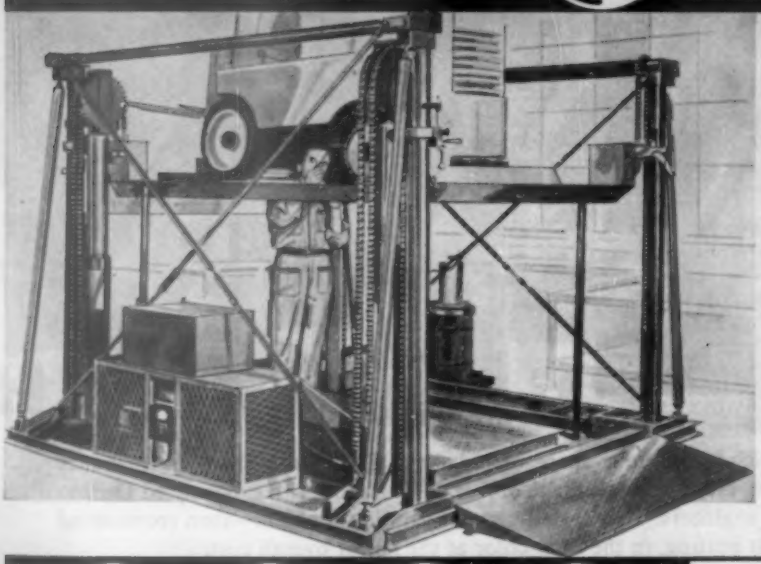
Tru-Touch gloves (*Wilson*) are so sensitive wearer can tell by feel if tossed coin is heads or tails. Disposable. Cost: about 7¢. **(258)**

Nygran gloves are something else again: heavy work gloves (*Granet*) with nitrile rubber cover which offers superior resistance to oils, grease, solvents, acids. Also to abrasion, cuts, high and low temperatures. **(259)**

Food bar (*Western Urn*) for plant or office serves as snack bar for coffee breaks or as small cafeteria. Two 8-ft. sections form complete 16-ft. self-service unit. One attendant can handle entire operation. **(260)**

Turn the page

from the ground UP Colson builds it better...



Colson maintenance machinery and equipment is designed to make each specific job quicker, safer, easier. Colson products actually prove, by outperforming and outlasting all others, that quality costs less when you buy the best!

No pit or sub-surface installation necessary with a Colson Lubrilift! Maintenance crews get under and inside to speed up greasing entire fleets of 3 and 6 ton fork lifts, as well as other trucks and tractors, with minimum labor and maximum efficiency, economy and safety.

Send today for FREE catalog illustrating Colson stationary and portable industrial platform and maintenance lifts! Capacities from 2,000 to 20,000 lbs.

THE COLSON CORPORATION
7 South Dearborn Street · Chicago, Illinois
Plants: Jonesboro, Arkansas; Elyria, Ohio; Somerville, Massachusetts; Toronto, Can.

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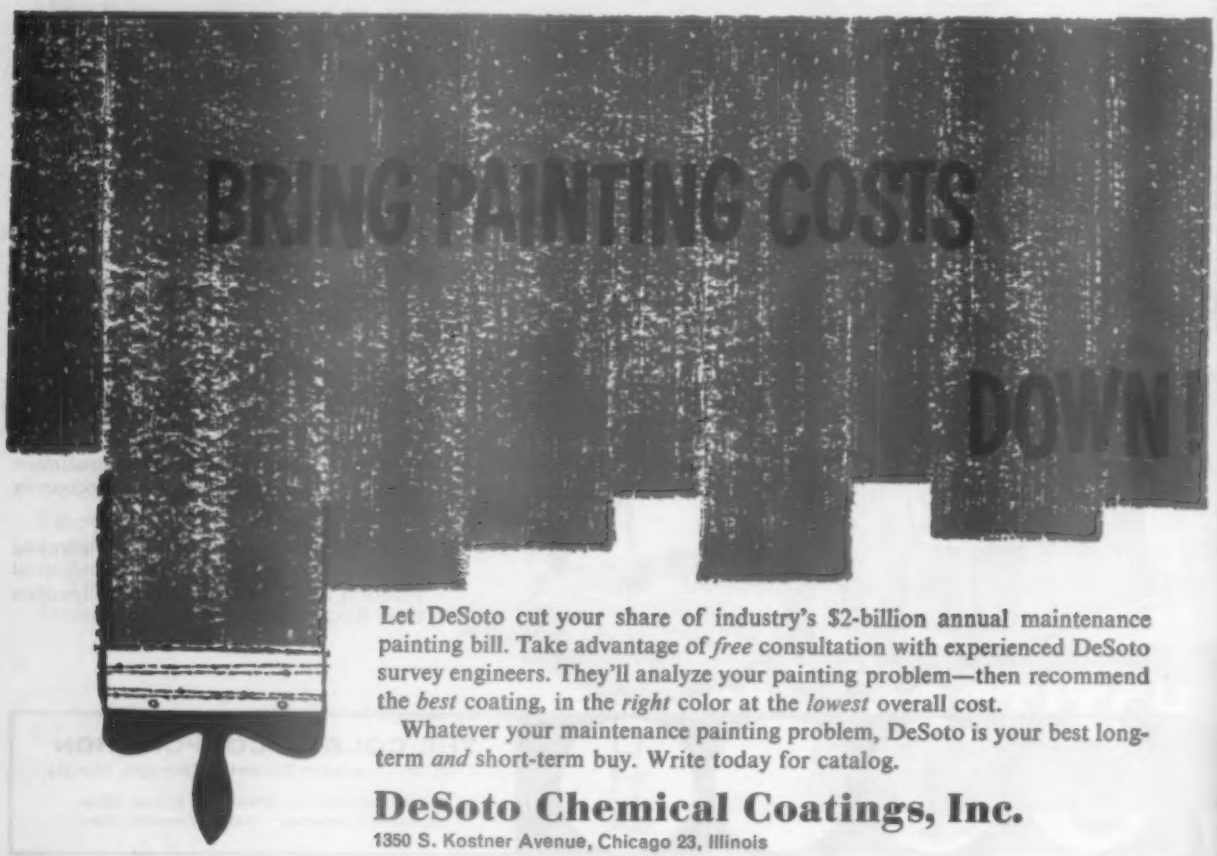
Rubber wedges (*Shelley*) prevent accidents in handling or stacking heavy rolls, drums, cylinders, pipes. Ribbed tread guarantees non-skid grip on floor. Resilient top surface fits curve of roll. **(261)**

Good news for mechanics: Ratchet (*Crescent*) has only 7 parts instead of 12 to 18. Small neoprene plug actuates and holds pawls in position, eliminates need for springs. In ¼-, ⅜-, ½-, ¾-in. square-drive models. **(262)**

Tramp iron on floors, aisles, driveways, parking lots? Magnetic sweeper (*Magni-Power*) picks up like magic, cleans itself in 30 sec. **(263)**

Guide to better projection (*Radiant*) explores techniques of showing films, slides, filmstrips; covers problems of light, room shape, seating, sound; helps select best screen size, surface, model. **(264)**

It may be too late for your company to participate in Cleaner Air Week scheduled for Oct. 22-28. But why not a cleaner air week on your own? Handbook (*Air Pollution Control Assn.*) tells how to proceed. **(265)**



Let DeSoto cut your share of industry's $2-billion annual maintenance painting bill. Take advantage of *free* consultation with experienced DeSoto survey engineers. They'll analyze your painting problem—then recommend the *best* coating, in the *right* color at the *lowest* overall cost.

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1350 S. Kostner Avenue, Chicago 23, Illinois

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monotrol speeds production handling

Only

HYSTER® has it!

At American-Standard Plumbing & Heating Division—Hyster lift truck with Monotrol control handles millions of pounds per month—in brass foundry at Cincinnati, Ohio.

All driving functions except steering are foot controlled—for safe, rapid handling.

Right foot Monotrol pedal controls power—forward-reverse—Hystamatic transmission. Left foot controls brakes and truck inching. Hands are free for steering and load control.

Safest, easiest trucks to drive. Quickest to service—cheapest to maintain.

Call your Hyster dealer or write for literature.

INDUSTRIAL TRUCK DIVISION—Lift trucks and attachments, mobile cranes, straddle carriers
TRACTOR EQUIPMENT DIVISION—Construction and logging equipment; Heavy-duty trailers
INTERNATIONAL DIVISION—Overseas truck and tractor manufacturing, sales and service

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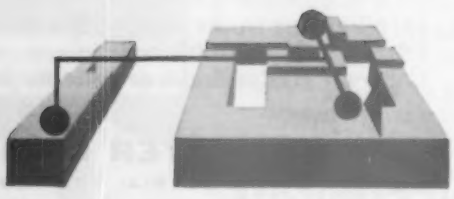
HYSTER COMPANY
INDUSTRIAL TRUCK DIVISION
P. O. Box 847 • Danville, Illinois

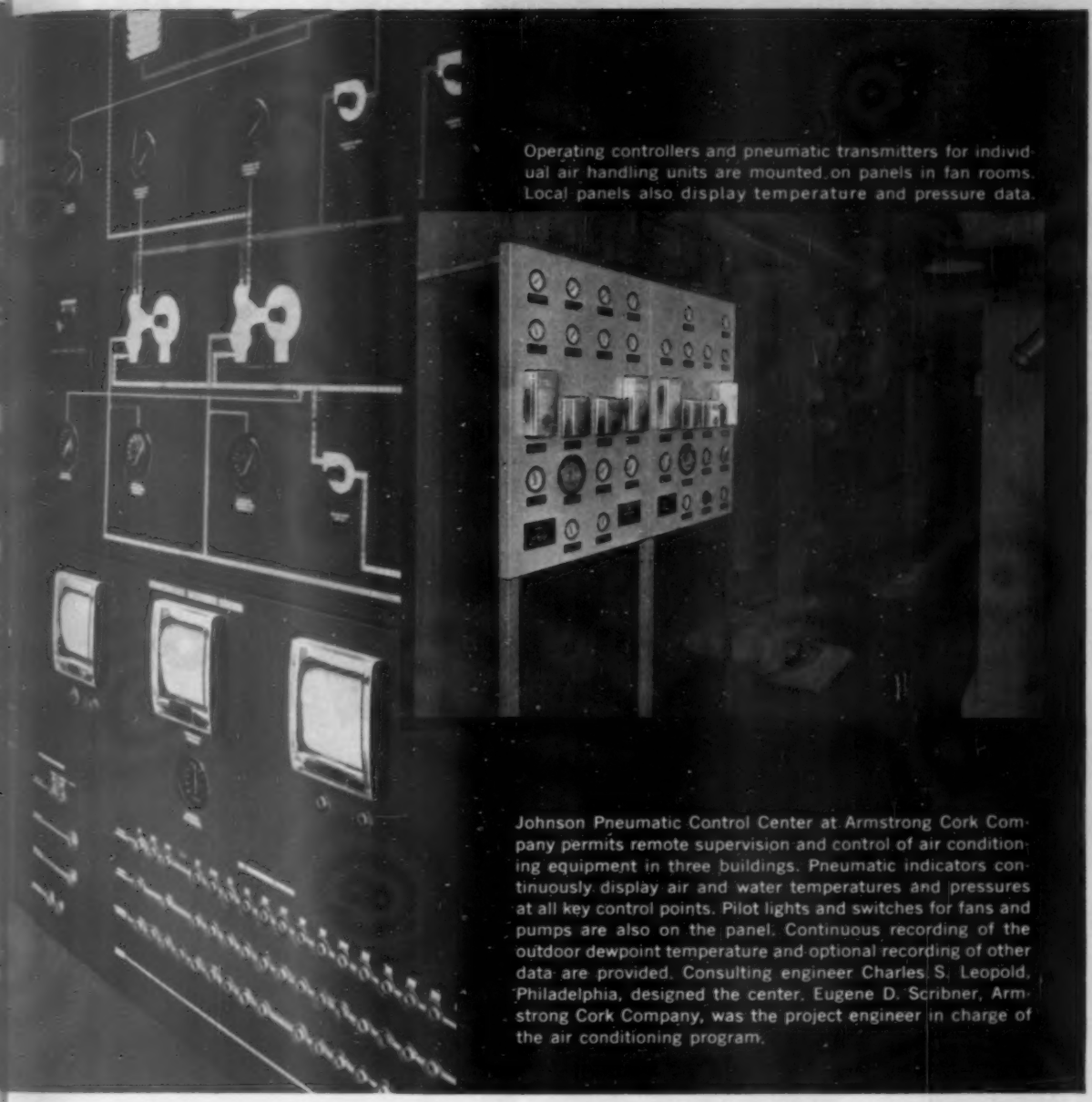
CENTRALIZED CONTROL REDUCES AIR CONDITIONING COSTS

ONE CONTROL CENTER SERVES THREE BUILDINGS AT ARMSTRONG CORK COMPANY



Nineteen large central fan systems were required to air condition Armstrong Cork Company's home offices in Lancaster, Pa. With equipment dispersed among ten locations in three buildings, supervising and operating the numerous systems posed a major cost problem.

The answer was the installation of a Johnson Pneumatic Control System with a control center for con-



Operating controllers and pneumatic transmitters for individual air handling units are mounted on panels in fan rooms. Local panels also display temperature and pressure data.

Johnson Pneumatic Control Center at Armstrong Cork Company permits remote supervision and control of air conditioning equipment in three buildings. Pneumatic indicators continuously display air and water temperatures and pressures at all key control points. Pilot lights and switches for fans and pumps are also on the panel. Continuous recording of the outdoor dewpoint temperature and optional recording of other data are provided. Consulting engineer Charles S. Leopold, Philadelphia, designed the center. Eugene D. Scribner, Armstrong Cork Company, was the project engineer in charge of the air conditioning program.

venient, centralized supervision and regulation of the equipment in all three buildings. The panel provides the engineer with a total of 323 visual data checks and remote controls, plus diagrams of the air handling systems and refrigeration circuits.

The advantages of this control center are impressive. It enables just two full-time men to handle a complex job. Through increased productivity alone, the first cost of the center is expected to be recovered in about 10 years. In addition, it provides the means to minimize power consumption and prolong equipment life. On several occasions, the immediate detection of off-normal conditions has prevented down-time and equipment damage.

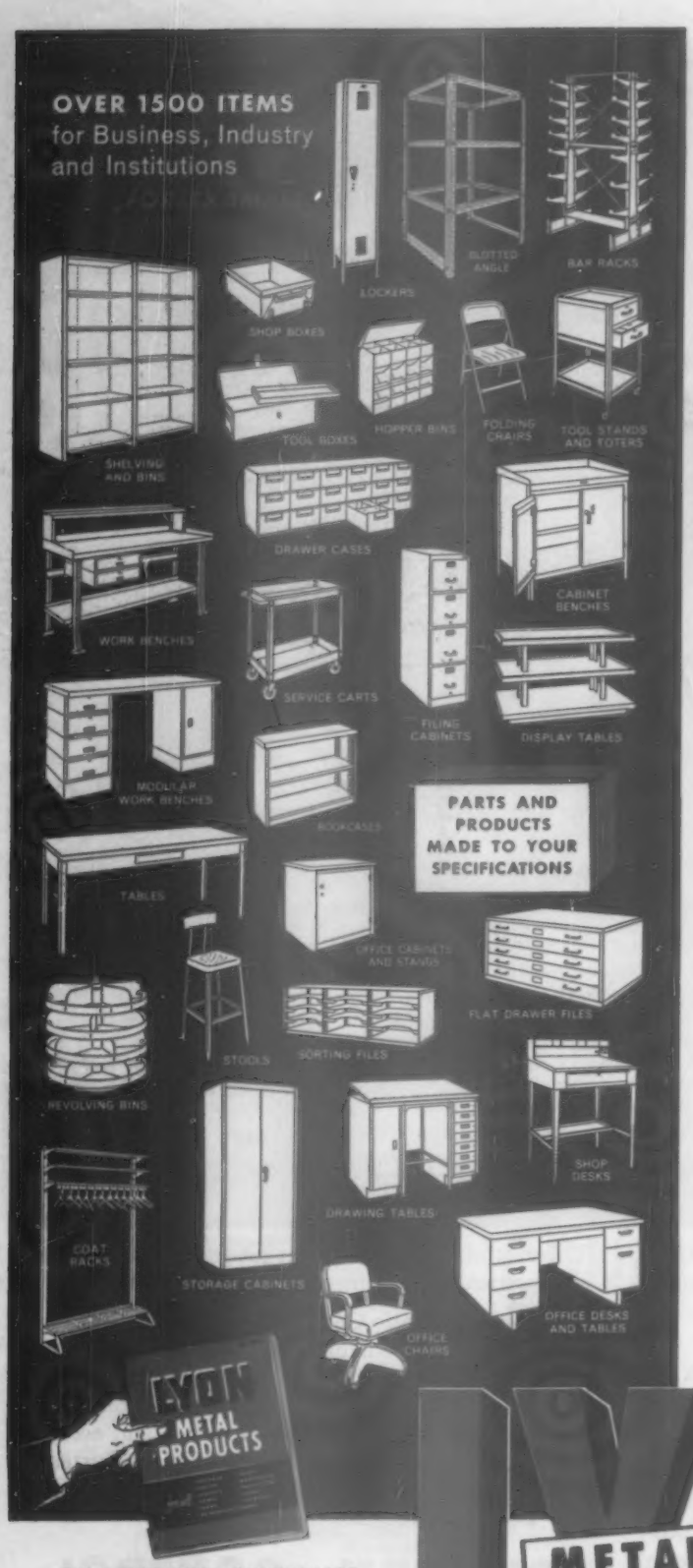
And, in conjunction with some 480 Johnson Room Thermostats in the offices, it assures ideal thermal environment at all times for Armstrong employees.

Johnson Pneumatic Control is applied to all types and makes of air conditioning, heating, and ventilating equipment, and to a wide range of industrial processes. When you build or air condition, take advantage of the superior performance and economy features of a specially planned Johnson System. Johnson Service Company, Milwaukee 1, Wisconsin. 110 Direct Branch Offices.

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885



THIS CATALOG ILLUSTRATES
THE WORLD'S MOST
DIVERSIFIED LINE
OF STEEL EQUIPMENT
IT'S FREE!

1ST

FIRST CHOICE

7 TO 1

It was Lyon by a landslide in a 1955 preference survey conducted by an independent organization among key men in companies throughout the country. They gave Lyon 5 times more first choice votes than the next highest manufacturer.

In a comparable survey made in 1960, it's an even greater landslide—7 to 1 is the latest margin—and Lyon received more exclusive mentions than the next twenty-two companies combined!

Your nearest Lyon dealer offers the world's most diversified and *most preferred* line of steel equipment—quality protected to give you the most for your investment.

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LYON®
METAL PRODUCTS

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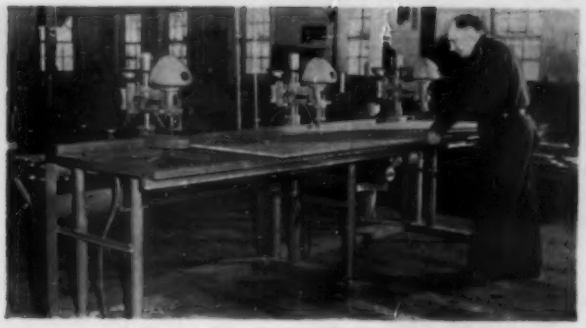

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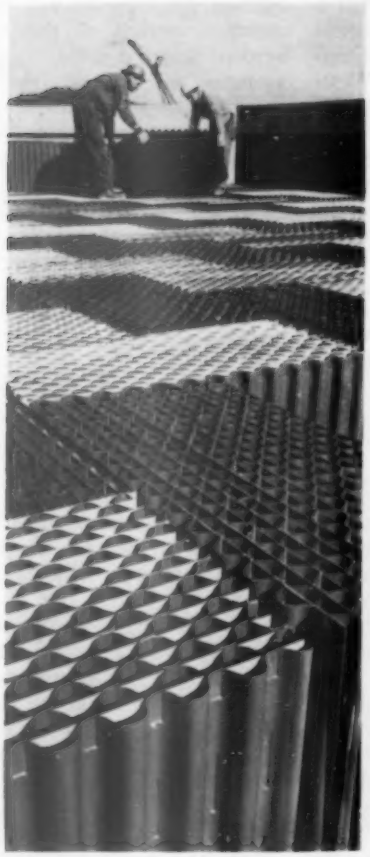

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FACTORY'S CASE BOOK OF

ENGINEERED PLANT SAVINGS

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FACTORY'S CASE BOOK OF

ENGINEERED PLANT SAVINGS

NORMAN H. SOLON, EDITOR

No. 47 October 1961

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Test booth is jack-of-all-trades

A new semi-automatic test booth is performing complete commercial electrical checks on small and medium power transformers at Westinghouse Electric Corporation's Sharon, Pa., plant.

By incorporating motor-operated devices, newly developed metering systems, and engineering studies, the new facility consolidates the entire test system into one booth. As a result, testing time is two-thirds faster and measurements are more accurate than with the multi-booth system formerly used. The new operation is safer, yet requires less skill and effort by the operator.

To begin with, there's no need to lug heavy cables. A crane brings the test leads to the transformer being checked, raising or lowering leads to the level of the transformer terminals. The operator has only to connect them. Tap changers on the booth power source transformers are motor-driven, and are controlled from one selector switch.

Even tap changes for the potential and current transformers used for metering are driven to their positions through motor-operated devices controlled by a selector switch at the test console.

A master switch for each test activates only that part of the console required for the check. Simplified systems, through the use of set-up switches, permit all the low-volt-ampere and low-voltage tests such as ratio, polarity, etc., to be made through one set of leads. Another set for high-voltage, high-kva. tests is connected to the transformer for checks involving loss measurements.

Westinghouse engineers came up with an unusual solution to the hazards of high-potential leads strung across the test area. They mounted the insulation testing transformer right on the crane. The high-voltage lead is thus connected to an insulated trolley that runs across the length of the train. From this trolley a single uninsulated wire connects to the transformer terminals. Voltage measurement for the high-potential test is done through a capacitance tap on the bushing of the test transformer, thus eliminating need for a sphere gap.

For loss measurement testing, one meter shows the average of each of the three-phase rms. voltage. A second meter points out the average of all three phases. A third shows total power of the three phases. Similarly, one meter presents the average of the three rms. currents. Meters and switches are permanently mounted in the test console to reduce handling damage and accidental changes in calibration.

Checks obesity

This plant-made scanner accurately measures the thickness of any part of a standard-size laminated sheet at Synthane Corporation, Oaks, Pa. The equipment consists of a table and a "C" arm fitted with ball anvils for rolling contact.

The scanner is pre-set for thickness to be measured by means of gauge blocks. The deviation in thousandths of an inch over and under the specified thickness can easily be read since all parts of the sheet are brought between the anvils.

Formerly, only the outside of the edges could be measured by a micrometer. Thickness variation throughout could not be checked.

Synthane is using the scanner primarily on copper-clad sheets for printed circuits where the total thickness can be critical.

Dumbwaiter beats the stairway blues

Physical fitness propaganda be hanged. If chugging up and down stairs just doesn't interest you, try on this idea (Pratt & Whitney Aircraft Company, Montreal) for size.

A dumbwaiter has taken the huffing and puffing out of bringing blueprints from the first-floor reproduction section to the second-floor product engineering department. A major change in product skyrocketed the need for prints—the 200 engineers in the department needed them "yesterday."

The problem was solved by literally punching a hole through the ceiling and installing a dumbwaiter —a $1500 operation.

After cutting through the 3-ft. concrete ceiling and rearranging pipes and electrical feeders, a 24-ft.-long, 12-ft.-sq. steel shaft was installed. It was compatible in color and design with the office surroundings so as not to stand out like a sore thumb. To comply with fire regulations, a sprinkler was positioned on top of the shaft and the two openings were fitted with sliding metal doors.

The 31x32-in. plywood carriage —powered by a simple rope and pulley set-up—is divided into three sections for easy handling. Since blueprint-room personnel are inclined to make like Whitey Ford and toss the prints in, there's an inch of rubber-impregnated horsehair on the carriage floor to protect the edges of the prints.

Breaking the rule prolongs motor life

"Never put oil in a commutator." That's a basic axiom of d-c motor maintenance for most electricians. Yet Jack Henry, chief electrician at National Portland Cement Company, has a remarkable record of service for kiln drive motors whose commutators are oiled regularly.

Thanks to an adequate preventive maintenance program, NPC has had two 100-hp. motors in constant service for 25 years without a failure. And a 125-hp. d-c unit has been operating perfectly since installation in 1955. But before you rush out with the oil can, read how and why it's done. Improper lubrication can cause damage.

The trick is to put just the right amount of oil—a very thin film—uniformly over the surface. At NPC, a canvas pad lightly dampened with a high flash-point transformer insulating oil (Wemco Type C, Westinghouse Electric Corporation, Pittsburgh) is held lightly against the commutator surface several times a week. Following this, the surface is cleaned with low-pressured air to eliminate any dust left between the commutator bars.

The oil treatment, contrary to popular belief, apparently smooths brush action, reduces arcing, and cleans the commutator surface—all at the same time.

At any rate, NPC has been able to operate the motors in a kiln dust atmosphere without having to turn down or polish the commutators.

Other PM measures at NPC include weekly brush tension checks with a spring scale and occasional cleaning with a standard commutator cleaning solvent.

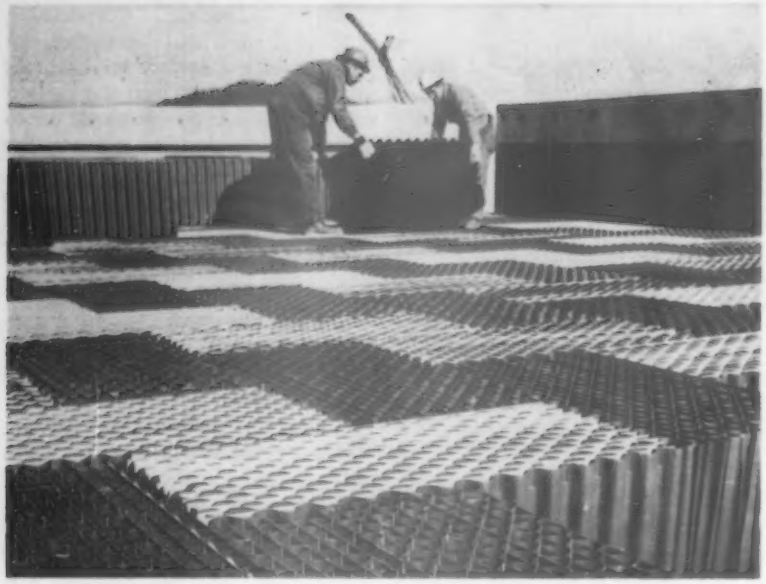
Source: Harold Henry, Chief Electrician, National Portland Cement Company, Bethlehem, Pa.

Map for keys

Lost keys in any factory cause headaches, especially at night. And the wrong keys for the right doors are equally frustrating. But maintenance workers at Sola Electric Company, Chicago, have no trouble picking the right key out from a maze of others with this key map.

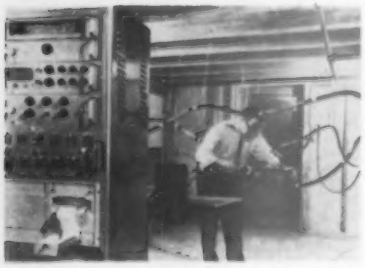
Made for $8 and two hours' work, this time-saver is nothing more than a complete set of floor plans glued to a plywood board. Hooks on the map hold keys for particular rooms. Thus, a quick check of the map finds the right key.

The maintenance foreman is responsible for seeing that keys return to the right places on the map.



ARTISTIC FILTER USES VERTICAL APPROACH

The eye-catching design in this photo is not a collection of organ pipes, but an efficient rigid vinyl plastic filter. It's used to separate organic waste from water at Rome Kraft Company, Rome, Ga. More than 6000 of these 2x4-ft. vinyl filter-comb units (B. F. Goodrich Company, Akron, Ohio) are stacked in layers to form a 30-ft.-high maze. Thus water is filtered vertically instead of horizontally as with the conventional rock-type filter—a big saving in space. As the plant's waste water trickles down, organic matter is deposited on the sides of the unit, making the water fit for discharge into a nearby stream.



Robot voltmeter gives man the boot

The man at the right of the photo is really out of the picture. This electronically controlled voltmeter tests the performance of electrical and electronic connectors and fittings automatically. And there's no need for manual checking with a pyrometer, at Thomas & Betts Co., Inc., Elizabeth, N. J.

The temperature of the parts and the current in the test assembly are automatically recorded and transcribed to tape for future analysis by the electronic machine.

Design criteria and applicable specifications determine the test time. And current control equipment, integrated with the digital voltmeter, continually monitors the test current around the clock.

Office on wheels goes everywhere

There's no geography to paperwork. It's needed everywhere in the plant. And wherever billing orders and typewriters are needed at Timken Roller Bearing Company's Canton, Ohio, plant, these offices on wheels fill the bill.

They're used primarily for making out billings and checking steel billets and lubes for freight car shipments to other plants. The company can now load freight cars from any point next to a railroad track and have the necessary paper on hand.

Steel sleeves have been welded to the bed of the panel truck to hold the legs of an office desk. A dome light and desk lamp give adequate lighting for nocturnal work. During summer dog days, the wide rear doors can be opened for ventilation. And there's a gas heater for cold weather. A two-way radio provides communication with the main office building.

Making a game out of housekeeping

Competition pays off more effectively for housekeeping than clever posters or cute slogans at Rocketdyne (Canoga Park, Calif.), division of North American Aviation, Inc.

Both shop and office departments compete separately in the monthly ratings. As shown in the tearsheet above, departments are rated on the basis of 100 and are gigged for errors. For example, Department 546 received three gigs for excess débris around the area.

Winners and runner-ups in the competition are announced in the company house organ. Housekeeping becomes a personal matter to the workers because they develop pride in their departments. The occasional goofer-off is given the word to get on the ball by his co-workers independently of the foreman.

Result: An over-all clean plant.

Long-grip fork truck feeds the furnace

Intense heat is no hindrance to this lift truck as it charges two giant melting furnaces at Mirro Aluminum Company, Manitowoc, Wis. Reason: A special furnace-charger attachment that feeds from a distance.

The attachment consists of a guideplate-mounted 180-deg. rotator and extension-mounted, adjustable-spread forks. The truck picks up loads of scrap and ingots in slotted containers, rotates containers inside furnace doors, and gently dumps contents into the metal bath.

The truck averages 130 round trips every 24 hours.

Color cards flag absenteeism

Color is an important—and successful—management tool in cutting absenteeism at Bassick Company, Bridgeport, Conn. Bassick's control program has slashed absenteeism from 7% to below 2%. And has supplied the company with a sound position to fight employee complaints, union grievances, and arbitration cases.

First-line supervisory action is the key to the program's success. But the supervisor can only be as good as the tools he has to work with. And among several good tools the color cards are tops. They flag both unreported and three-day illness absences.

Spots Rule Violations

If an employee fails to call in or report his absence by the end of his shift, the timekeeper automatically replaces the regular time card with a red "unreported absence" card. Upon return to work, the employee must ring in on the red card. Instructions on this card direct him to report to his supervisor before going to his work station. The card also indicates the number of times this employee previously failed to call in. The supervisor thus has the facts before him when he interviews the worker. Space is allowed on the card for (1) reason for failure to call in, (2) reason for absence, and (3) disciplinary action taken or recommended. The supervisor is required to fill the blanks, sign the card, and forward it to the manager of manufacturing. Hence, the red card has both deterrent and procedural value.

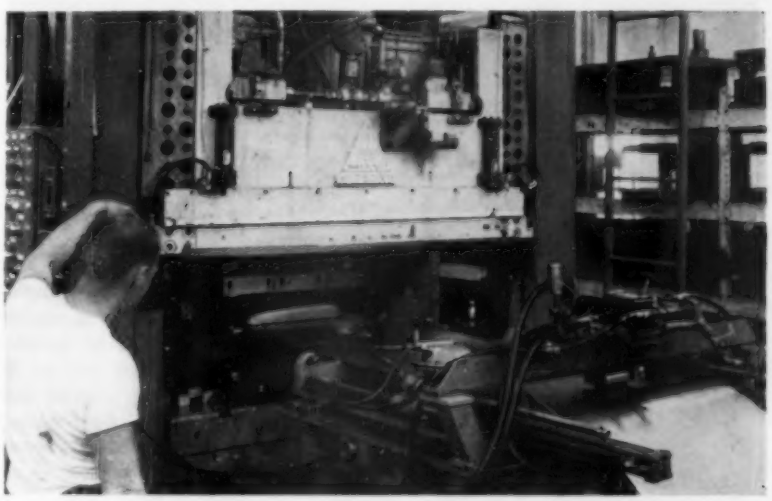
A blue time card similarly assures adherence to the three-day absence rule. This rule states that any employee absent for three days or more because of illness or injury must present a doctor's fitness report or pass a company physical. As before, the timekeeper substitutes a blue "three-day absence" card for the regular card. When the worker returns, the blue card instructs him to punch in and report at once to the medical department. Here he gets a physical check-up and information is documented on his illness and, if necessary, checked. Only after he has satisfied the medical department's requirements can the worker report to his station.

Space-stingy fans

Two airfoil centrifugal fans with in-line air flow are beating the space barrier at Power Authority of the State of New York's Niagara Falls power project. They're installed in a 19x75-ft. fan room—where space is at a premium—suspended overhead by hanger brackets.

Because of in-line flow the fans can be installed in less space than would be required for the conventional scroll-type centrifugal fans. And performance characteristics are the same.

The units, manufactured at Westinghouse Electric Corporation, Hyde Park, Mass., are rated at 15,350 and 8100 cfm.



NO HANDS NEEDED WITH THIS FEED CONTROL

Applying plant-made feed controls to a set of four huge presses connected in series has increased efficiency and stepped up production at Square D Company's Lexington, Ky., plant. A vacuum device, moved by a reciprocating piston, grips and pushes the coil steel to the press. It then repeats the action by retracting and regripping the coil at a lower point. This procedure is possible because the stamping action of the press is reciprocal rather than continuous.

Radio controls a 5-ton crane

There's no need for a conventional operator's cab to control this 5-ton suspension crane—despite its lifting height capacity of 98.4 feet. The crane is installed at Uberlandzentrale Power Station in Baudour, Belgium.

Pushbuttons on a small mobile pulpit control the crane with the aid of a small aerial. Power from the traveling gear and the electric hoist is supplied through protected miniature sliding lines.

The single-girder crane is triply suspended and has a span of three times 32 feet. It can travel at 49.2-fpm. and hoist at 39.3-fpm. normal speed, 5-fpm. creeping speed.

The radio-controlled crane is manufactured by DEMAG Aktiengesellschaft, Duisburg, Germany.

Rolls up production

This specially designed heavy-duty saddle-type roller chain has quadrupled production per man-hour at Shuler Axle Company, Louisville, Ky. It allows the plant to consolidate its truck-and-trailer axle assembly steps.

The axle tubes were previously pushed to separate stations on movable racks, a time-consuming job.

Now a fork truck delivers tubes to a deck-lined rack at the beginning of the conveyor line. The tubes roll to an air-actuated escapement stop that is synchronized to release the tubes individually onto the moving conveyor saddles. The saddles, spaced to allow working room, steady the tubes throughout the conveyor trips. The assembled axles are moved from the discharge end of the 50-ft. conveyor by monorail for welding.

The electric-powered conveyor, manufactured by Logan Company, Louisville, Ky., moves at speeds from 1 foot to 20 feet per minute. A safety switch can stop the conveyor at any work station.

Three tools team up to double output

Three drill presses have ganged together to double production at Store Kraft Manufacturing Company, Beatrice, Neb.

The company uses the three presses (Rockwell Manufacturing Company, Pittsburgh) in a special set-up for routing slots in counter tops. The counter tops are set in angle-iron frames and moved into the routing bits turned by the drill presses. The two end drill presses are movable so that slots may be made anywhere in tops from 30 to 92 inches long. For routing, drill press belts are set at top speeds.

It used to take two men with a portable electric router to do the job. With the new set-up one man can slot twice as many counter tops as the two men did before.

Appliance workers see forest from the tree

Production workers at Westinghouse Electric Company, Columbus, Ohio, can now take personal pride in seeing a new major appliance roll off the production line. Each man knows exactly what part he played in its manufacture.

Company officials realized that it wasn't too easy for a worker to have personal satisfaction in a product when he does not even know how his work fits into the over-all program. So they decided to improve on the usual employee gathering in an auditorium when a new product was introduced.

A new electric range was brought right into the punch shop—its point of origin—and the work of each man was pointed out on cards placed on the range. For example, the front frame of the range in the photo was fabricated in Department K12 and plated in B11.

A meeting was held with supervisors to give a rundown on the product and point out the need for quality on each component.

Result: Unprecedented interest on the part of workers with constructive suggestions on what further steps could be made to improve quality of the product.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

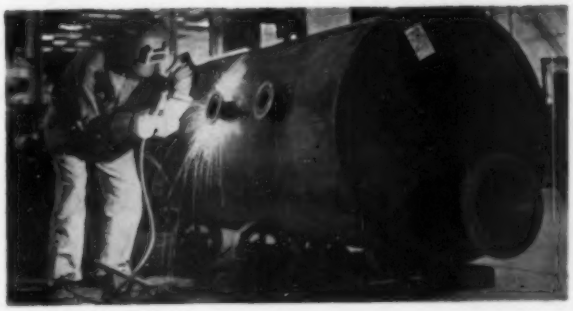
Champagne ideas at beer cost

The old cliché, "time is money," is nowhere so apt as in an industrial plant. But speed at Lockheed Aircraft Corporation, Marietta, Ga., isn't inevitably expensive. Here are three Lockheed time-savers—good for any plant—that are not budget-wreckers.

Playing the angles. These angled bars—used to hold non-level aluminum parts during Heliarc welding—have cut the set-up time of the operation to a fraction of that required by conventional methods. For instance, use of a vise not only takes time for set-up, but also restricts the operation since the vise has to be set at the edge of the table.

Now the angled bars, driven into holes in the table, furnish tensioned pressure to hold the work piece rigid. Time required for the pictured set-up: one minute. The 4x6-ft. table top is a 1¼-in. hot rolled plate with 1 1/32-in. holes on 8-in. centers.

The steel bars, bent at a 15-deg. angle are 1 inch in diameter. They're placed at holding points on the set-up, and then tapped with a hammer at tops of the angles. As a bar is driven into the hole, the angle brings tension to bear on the set-up.



Handling in jig time. It's quite a problem to move a heavy steel tank during welding. Most times it requires pure muscle or a mechanical hoist that involves hooking and unhooking.

Now a plain old rubber-tired platform dolly does the job with ease. Turned upside down, it becomes an efficient welding jig, that rotates the barrel at the touch of the welder's hand.

Halving hurries the hunt. The halving method identifies wires much faster than the old individual trial-and-error method. The non-colored wire bundles have cannon plugs on each end. These plugs label each wire with a letter, so the "J" wire in one plug must be the same as the "J" wire in the other plug. Before the second plug can be attached to a bundle, each wire must be individually identified.

Previous method was to hook an ohmmeter to a pin in the plug at end. Then touch the individual wire to the meter lead until the right wire was located.

With the new method, the ohmmeter lead is hooked to a scrap aluminum plate. Then the operator divides the bundle of wire in half, and touches the ends of one pile to the plate. If the meter shows this bundle has the desired wire, the other half bundle is eliminated, and the pile is halved again. In this way, the bundles are halved and halved again until the wire is located.

Payoff: Average time to check a 60-wire bundle has been cut from 45 to 20 minutes.

YOU BE THE ARBITRATOR

THE CASE OF

The absentee bikini

Out of the experience of the American Arbitration Association

Dorothy B. had two weeks' paid vacation due her. But the kind of vacation she wanted required an extra week, so she asked her supervisor if she could take the third week at her own expense. Looking at the vacation schedule, and taking into account orders on hand, the supervisor said he couldn't okay it then. But he suggested she phone during her second week and he would let her know whether she could have the third week.

Dorothy went off on her vacation but didn't get around to calling until the middle of the third week. Her supervisor was out and she didn't bother to leave a message. When she returned to work, she got a week off as a disciplinary penalty for her irresponsibility.

The union filed a grievance. "This is a case of rank discrimination," said the union representative. "Dorothy should have been permitted to take the third week off in the first place. The fact that you suspended her proves she wasn't urgently needed."

The company answered that the vacation schedule was eased during the fourth week. "Besides," the plant manager pointed out, "we have to keep the work force properly disciplined even when it's inconvenient for management."

Eventually the case went to arbitration. Suppose you were the arbitrator? How would you rule?

For the actual decision turn to page 190

Double-check in half-time with accuracy

An automatic weight-calculating system assures accuracy in the product packaged at Thomas J. Lipton, Inc., Hoboken, N. J.

In the past, one full-time inspector serviced nine machines, using a manual weight-and-adjust method. Now she can handle 20 machines with far greater accuracy.

Key to the new system is the Datamatic weight calculator (Scale Specialties, Inc., Denville, N. J.). Plugged electrically into a standard checkweigh-type scale, it calculates weight variations automatically.

There's a Datamatic station on each filling line. Each time 32 bags are weighed (in eight-bag units), the device averages the weight of each bag and charts it on a graph (photo). This creates a permanent visual record. Simultaneously, three 6-digit counters (Veeder-Root, Inc., Hartford, Conn.) record the total number of eight-bag units tested. And count the number of underweights and overweights.

With these two records it's a cinch to spot the faulty filling machine and make adjustments.

Under-belly heaters slash thawing time

Gas-fired under-car heaters have slashed hopper-car thawing time by 75% at Colorado Fuel & Iron Corporation's Pueblo, Colo., plant. Providing both radiant and convection heat simultaneously, the heaters thaw frozen coal in temperatures reaching 20 F. Each unit is rated at 500,000 Btu. per hour.

CFI installed 16 Radiarc units in groups of eight so two cars could be thawed at one time. Since the system requires no permanent foundation, blowers, fans, or electric power, installation was relatively simple.

Gas torches placed under the hopper cars used to do the job. But they were slow, taking an average of four hours to thaw a car. Also, demurrage and damage from direct flame impingement was often costly. With the new heater it takes only one hour to thaw the car and there's no danger of damage.

The heaters are made by Hauck Manufacturing Company, Brooklyn.

GE gives engineers a push ahead

There's a wide chasm between the bright young engineer grad just hired by a company and the experienced engineer who produces. But General Electric Company's Pittsfield and West Lynn, Mass., plants are helping to lay a bridge across that chasm by means of their professional development programs.

Here are a few examples:

• A refresher course for registration examinations with time off to take the examinations.

• Full or part tuition, plus cost of books, for graduate courses in local schools. Leaves of absences and financial assistance for fulltime graduate courses.

• Encouragement to participate in community activities and recording of such participation in personnel files.

• Preparation on company time of technical papers dealing with original work done as part of an engineer's regular duties.

• Trained technicians or draftsmen available to assist or carry on nonprofessional aspects of an engineer's work.

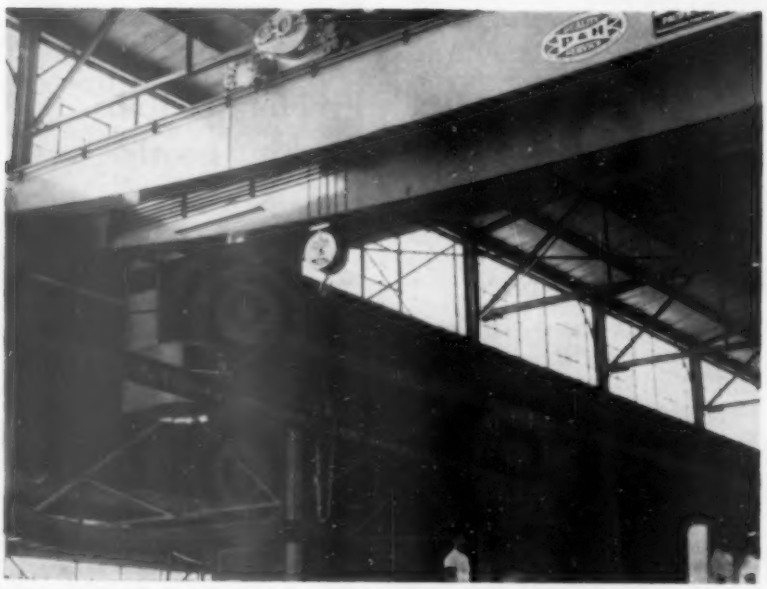
• Travel money for those presenting papers to technical societies.

• Assistance to engineer authors in the writing, presentation, and publishing of technical papers. Annual awards are given for the best paper published by a first-time author.

• Payments to authors by publishers made at brief ceremonies before the authors' managers and the general manager of the plant.

These two plants shared the National Society of Professional Engineers' 1961 Industrial Professional Development Award.

Reprints of the Plant Operations Case Book are available. Price 50¢. For quantity prices, write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.



THERE'S NOTHING SHOCKING ABOUT THIS CRANE

Maintenance workers don't have to worry about touching trolley conductors on the bridge of this traveling crane at San Jose Steel Company, San Jose, Calif. There's no danger of a shocking accident. Conductors are shrouded with a heavy-duty insulating material (Insul-8-Corporation, San Carlos, Calif.). Current collector fingers make contact with the conductors through narrow slits in the insulation. This allows the crane to conform to the new California state safety regulations.

CASE BOOK CAPSULES

Color-sensitive computer that can recognize and label the differences between 100-million hues is being marketed by Tokyo Shibaura Electric Co., Tokyo. The human eye can only differentiate 7.5-million colors.

Production-run flash welding of aluminum, magnesium, and magnesium-thorium alloys has now become feasible through a new process developed by Lockheed Aircraft Corp., Burbank, Calif.

Electronic equipment causing harmful interference to radio navigation and safety radio services may be ordered immediately out of use under amended rules of the Federal Communications Commission.

Flame-heated thermionic generator now converts heat from conventional fuel directly into electricity. It was developed by Atomics International, Canoga Park, Calif.

Completely transistorized facsimile communications system for the rapid transmission of graphic data has been announced. It's being produced by Fairchild Camera and Instrument Corp., Yonkers, N. Y.

Most powerful electron microscope in the world has been installed at the University of Pittsburgh. Made by Phillips Electronics and Pharmaceutical Industries Corp., Mount Vernon, N. Y., it provides direct magnification from 300 to 200,000 times, with photo enlargement beyond 2-million times.

Vending machines a space-age product? Not by a long shot. They were used 'way back in 219 B.C. to dispense holy water.

Alert-O-Matic device to rouse lethargic drivers from stupor *before* accidents occur has been developed by safety engineers at Liberty Mutual Insurance Co., Boston.

Are you a Tom Edison Jr.? Get into line. There's a backlog of some 196,000 applications at the U.S. Patent Office, Washington, D.C.

Pocket radio kind to aching dogs

A two-way communication system is performing a bevy of maintenance tasks at Douglas Aircraft Company, El Segundo, Calif. And without bulky transmitters to lug around. The transistor sets are pocket-sized.

The system is used by air-conditioning mechanics when they balance ventilation systems (photos). One of a two-man crew must work with the units on the roof while the other man is at the thermostats in the plant. Without the two-way set, the top man needs to be a four-minute miler to run up and down stairs to communicate with his partner.

Electricians use the radio while resetting controls for giant machine tools when electronic control systems are in separate rooms.

Oil-burning furnaces are kept running during emergencies with the help of the radios. For example, when a feeder line from the main storage tank broke, an oil tank truck was moved in. Control of the flow was maintained between truck and furnace room with the radio.

The transistor system has a half-mile range and operates on an 11-meter citizens' band. Its wattage is just short of one watt.

Bags s-t-r-e-t-c-h to shrink costs

Paper bags that stretch are shrinking the cost of bagging chemicals at American Cyanamid Company's Bound Brook, N. J., plant.

Bags are made of extensible kraft paper that is compressed and compacted in production. It stretches upon impact and takes much more punishment without breaking than conventional kraft paper.

The plant can now use lighter-weight bags of fewer plies with cost savings averaging $4 to $5 per thousand bags. To bag yellow prussiate, for example, now requires four-ply bags instead of five-ply as formerly. Over-all basic weight is only 270 pounds, as compared with the previous 310-lb. weight.

The extensible bags are made by Clupak, Inc., New York City.

Erector set dubs as paint booth

When a change in the size of product made its paint both obsolete, Chris-Craft Corporation, Holland, Mich., built one that would meet all production needs.

Structural pieces were sheared from lengths of slotted-angle steeel (Acme Steel Company, Chicago) and bolted together to frame the 30x15x12-ft. high booth. Sheetmetal side pieces, with lighting and spray equipment, were installed by bolting components through the slots and holes in the frame.

To allow for changing production sizes, a collapsible movable work platform was constructed. When a boat of different size needs to be painted, the platform is collapsed and rehinged to meet the new requirement. All boat surfaces, including cabin tips and hulls, can thus be painted without re-positioning.

Stacking device grips lips to shave space

This portable elevating truck and drum stacker has upped drum storage 30% at Delta Airline's Atlanta, Ga., hangar. It works by gripping the lips of the drums.

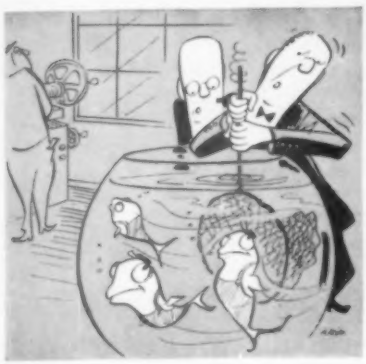
The drums are stored three-high in a semi-enclosed 40x90-ft. storage area. They were formerly stored four to a pallet, with a fork truck used for stacking. When single drums were needed or when drums were transferred from one pallet to another, they were handled manually.

The new system has halved aisle space and eliminated pallets, thus permitting solid mass storage. Sturdy planks are used as dunnage between tiers or drums for safety.

Mediator in blue gains plant status

Rodin's Thinker may or may not be your idea of the ultimate in sculpture, but he's a status symbol at Norair Division of Northrop Corporation, Palmdale, Calif.

As an added incentive to the company's suggestion award program, the top blue-collar suggester of the month and his foreman are recognized by copies of Rodin's masterpiece. A tie clasp with the thinker motif is presented to the foreman and a key chain with the same motif goes to the idea man.



Retirement plan for goldfish

Pension plans can take care of your retiring workers, but how can you pension off faithful fish?

Jumbo-sized goldfish have been long-time occupants of a pond in front of Western Electric Company's Kearney, N. J., plant. Now the company plans to build a new building smack on the pond, putting from 3000 to 8000 fish out of work. Solution: Find them other employers.

When a company spokesman offered the fish to any government agency who wanted them, a national network program and *The New York Times* picked up the story.

Judging from the results, automation has no terrors for these aquatic workers. Goldfish are very much in demand. Goldfish employers from every section of the country wanted in. To date, about 25,000 requests have been sorted from points as distant as La Jolla, Calif., and Memphis, Tenn.

Most of the fish were sent to their new jobs by mail, but Western opened its gates to net-carrying goldfish fanciers who wanted to pick up their prizes in person.

Mobile book rack perks memories

Ever go over to storage for a part you can't identify? You know what you want, but that doesn't help the store clerk when you haven't a number. This kind of frustration can't happen at Hughes Aircraft Company, Culver City, Calif. Here's why:

This book rack on wheels mounted on a U-rail track contains all manufacturers' parts for plant equipment, filed alphabetically. When a maintenance mechanic wants a part he can't identify, he simply looks it up in this roller-catalog file (top photo). He can then write out an intelligent stock withdrawal form which he hands to the store clerk. And if the clerk, in turn, has to look up a part number, he just has to roll the restless book rack to his side of the counter, and he's in business. Result: time, effort, and tempers are saved.

Traveling die doctor

This welding and tool shop on wheels is a trouble-shooter at Ford Motor Company's Dearborn, Mich., plant. Ford has equipped six of the "welding buggies" with welding equipment, grinders, and other tools to handle on-the-spot die repairs.

To minimize downtime, the six buggies can be radio-dispatched via a two-way communications system (Motorola, Inc., Chicago).

The buggies are a result of Ford's employee suggestion program. The brainstormer responsible collected a whopping $6000.

Comfort with safety

Torsion-spring suspension seats with safety belts attached to seats and floor are providing both safety and comfort for drivers of 13 long-distance vans at Timken Roller Bearing Company, Canton, Ohio.

Seat belts used previously were not connected to the floor. This meant vibration and physical irritation. The new seat and belt alleviate these conditions.

Garage door for boxcar

Out-sized loads create no problems for the Southern Railroad System, Bessemer, Ala. The whole side of this boxcar is a door.

The clear opening of 50½ feet is provided by the roll-up aluminum side doors. With it, lumber, large machinery, large boxes, and other hard-to-handle freight can be loaded on the boxcar as easily and economically as onto a flat car. And there's the added advantage of having the freight safely enclosed.

The car can be loaded from either side and the full-length door rolls into the ceiling of the car like a garage door.

To protect freight, the boxcar is equipped with a cushion underframe. This device, in the center of the car provides 30 inches of hydraulic cushioning in either direction.

The jumbo-door boxcar was manufactured by Pullman, Inc., Chicago.

Plastic putty-patching pays

Plastic putty has successfully repaired seam and rivet leaks on 25 tanks of various sizes at Standard Oil Company's Portland, Ore., Center. And has done it at a fraction of the cost of welding.

Thirteen of the tanks could not be welded because they were made of iron plates. Use of Isopolyester putty on these tanks—at a cost of $1400—averted a $127,000 capital expenditure for tank replacement. The remaining 12 tanks were repaired with putty at a cost of $4500, compared to an estimated welding cost of $70,000. These tanks would have required complete re-welding since heat from partial welding would have opened adjacent seams and rivets.

To patch a tank externally with the putty, the product level is lowered below the work area. The area adjoining the corroded part is sandblasted or wire-brushed, then the plastic compound (Oronite Chemical Company, San Francisco) containing a promoter is catalyzed and applied. Patches adhere well to the surface, cure in 24 hours.

YOU BE THE ARBITRATOR

Continued from page 186

The award—The arbitrator said the layoff was proper punishment for Dorothy's failure to telephone during the second week. Her conduct, he said, reminded him of the story of the bartender who asked the saloon keeper whether Jones could be trusted for a drink. "Has he already had it?" asked the owner. "Yes," answered the bartender. "Then we can trust him for it," was the reply. The arbitrator said Dorothy apparently operated on that principle when she asked for the third week after she had already taken part of it.

Caution: The award in this case is not an indication of how other arbitrators might rule in apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Templates by tape

Substituting an enscriber for the customary cutting tool on this numerically controlled profile mill (Kearney & Trecker Corporation, Milwaukee, Wis.) is paying off in greater accuracy at Boeing Airplane Company, Seattle, Wash.

The machine is being used here to develop template drawings. This used to be done manually. Cost is about the same, but the processed recording tape that controls the mill is always available for additional templates and tooling use.

SE THESE DEAS...

O GET UP TO AN EXTRA 4% NET PROFIT

Out of the Texaco man's briefcase comes a wealth of ideas for cost control through organized lubrication—Texaco's "Stop Loss" Program. Managers in many industries are already using these plans to reduce losses in three important areas: production, maintenance and purchasing. Their savings go directly into profits—the average is a 4% gain in their net. Get the facts. Write for our informative folder: "How to Starve a Scrap Pile." **TEXACO** INC., 135 East 42nd Street, New York 17, N. Y. Dept. F-191

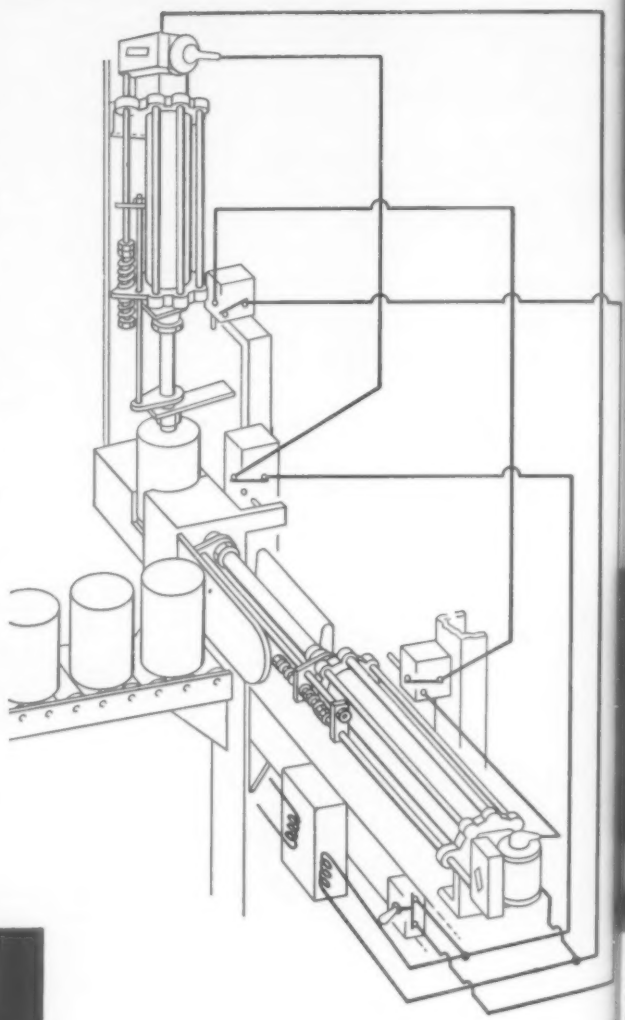
TEXACO

YOU CAN BUILD THIS SIMPLE MACHINE TO LABEL, STAMP, CAP OR SEAL

This SPOT-A-MATION IDEA is another example of how much more simply and economically an operation can be automated using Bellows "Controlled-Air-Power" Devices. The ease of construction and low cost also suggest why these versatile work units have stimulated the imagination and creative ingenuity of cost-conscious men in all types of industries.

Originally designed to punch holes in the bottoms of clay flower pots, this shop-built machine is adaptable to many other operations, such as inserting lids in cans, applying labels, stamping numbers, etc. The two Bellows Air Motors are interlocked to work alternately. A gravity conveyor delivers a clay pot to the first Air Motor, which moves it to a position under the second Air Motor. After the piston rod of the second Air Motor has moved through the work stroke and returned to "up" position, the cycle automatically repeats. This is practical, low-cost automation.

Now, stop a moment and ask yourself a question: "How can I use Bellows "Controlled-Air-Power" to produce more at less cost in *my* plant?"



An adaptation of this SPOT-A-MATION IDEA permitted a drug firm to plug bottles—automatically—four times faster than had been done by two operators. Because sterility was vital, automating the operation with Bellows equipment eliminated the possibility of contamination by human hands.

THIS SPOT-A-MATION IDEA FILE IS YOURS ON REQUEST

Contains installation data, wiring diagrams and equipment lists for scores of Bellows "Controlled-Air-Power" applications, enabling you to automate existing machines or build your own low-cost special-purpose equipment. Write for yours today. No obligation. Address Dept. FA-1061, Bellows-Valvair, Akron 9, Ohio.

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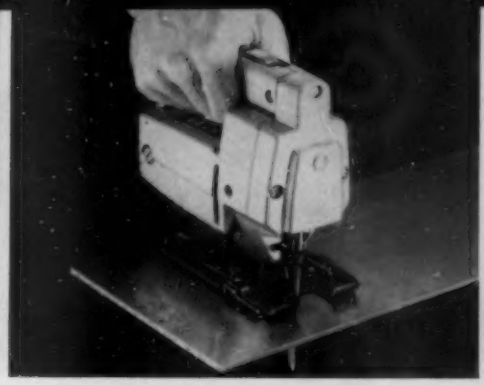
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

NEW IDEA—Electric Hacksaw! Has 2 speeds for cutting all metals from stainless and cast iron to mild steel, non-ferrous metals (Model 701).



NEW IDEA—2-Speed Jig Saw! World's fastest—high speed for cutting wood, plastic, composition; low speed for metals (Model 160).

NEW IDEA—"Burnout-Protection" Motors. New ultra powerful saw motors backed by full year free service policy, (on all Skilsaw circular saws).

9 Do you know about these NEW SKIL Power Tool ideas?

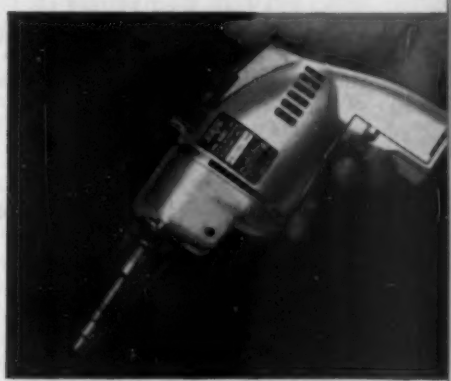
NEW IDEA—Treaded Disc Sander Pad. Prevents disc slippage. Quick change nut locks on steel pins—no clogged threads (all Skil Disc Sanders).

NEW IDEA—2-Way Sander. Orbital action for fast sanding . . . straight line action for finest finishing! Big 4½" x 9" sanding pad (Model 692).

NEW IDEA—3-Way Hammer. Hammers, drills, does both simultaneously for fastest masonry drilling at lowest cost per hole (Model 726).

NEW IDEA—Low Cost Air Buffer and Grinder. Uses super-tough tungsten carbide rasps, rods. Complete kit—Model 412—$135.00.

NEW IDEA—Improved 2-Speed All-Purpose Saw. High speed cuts wood, plastic, compositions; low speed cuts metals (Model 700).



NEW IDEA—Lowest Cost Power Screwdrivers. For light to heavy duty production. Skil Model 139 sells for $45.00, reversing model 140—$53.00!

Ask your Skil distributor for demonstrations. Look under "Tools-Electric" in the Yellow Pages. Or write for 68-page catalog: Skil Corporation, 5033 Elston Avenue, Chicago 30, Ill., Dept. 117J

SKIL POWER TOOLS

For more facts Circle 505 on Reader Service Card

HUMAN RELATIONS

By Vivian Lunardi Assistant Editor, FACTORY

Green stamps pad paycheck

"Yes, Virginia, I earned some green stamps this week." For the uninitiated, payment in green stamps is a new gimmick in the cost-cutting campaign at American Machine & Foundry Company's J. B. Beaird subsidiary. And with a shove from the home front, this Shreveport, La., firm is really hitting paydirt.

In a three-month drive, Beaird reduced costs by $138,000 which included $53,000 in direct labor, $27,000 in indirect labor, and $58,000 in fixed expenses. And what did this neat bundle cost? A million and a half green stamps, publicity expenses, and merchandise prizes for a grand total of $6000.

Green stamps were offered as the incentive to increase productivity, save material and equipment, and boost sales. An executive committee determined the quantity. Each week the extra productivity showed up as stamps in pay envelopes with the greenbacks.

Families find it hard to resist urging Dad to do a better job when green stamps are dangled as reward, claims company President John L. Tullis. Furthermore, it costs a company only $2.80 to purchase 1000 stamps, which a worker would have to buy $100 worth of merchandise to get.

Voluntary or forced retraining?

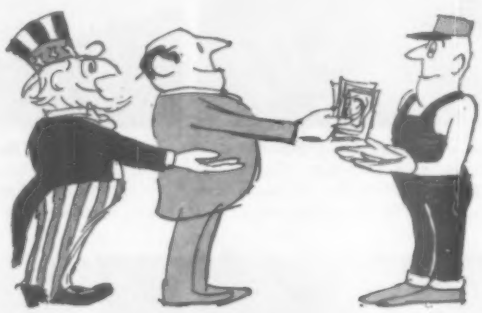
The handwriting's on the wall for management. Industry must take the initiative to formulate a retraining program for workers displaced by automation. Otherwise, the government may dictate its own terms and force industry to follow an impractical solution.

Talking before the Rotary Club of Houston (Tex.), Secretary of Labor Arthur J. Goldberg expounded Administration views on the problem. He pointed out that hard-core unemployment should be a matter of concern to both management and labor, not just to government. Management must automate, says Goldberg, but it must "stop automatically resisting proposals to ease the human burden of automation, whether they [proposals] are made by labor unions or public officials."

Goldberg rapped labor on the knuckles, too. He said it must meet management half-way by abandoning restrictive practices. "Both sides must think out the operations of seniority systems. Both sides must concentrate on devices to increase labor mobility."

More cash buys less

Inflation eroded the production worker's buying power last year despite an increase in his net spendable earnings. A worker with three dependents averaged $83.74 in take-home pay, compared with $81.59 in June, 1960. For a worker with no dependents, take-home was $76.12 this June, $74.03 last year, reports the Bureau of Labor Statistics, Washington, D. C. During this period, cost of living rose about 20%.



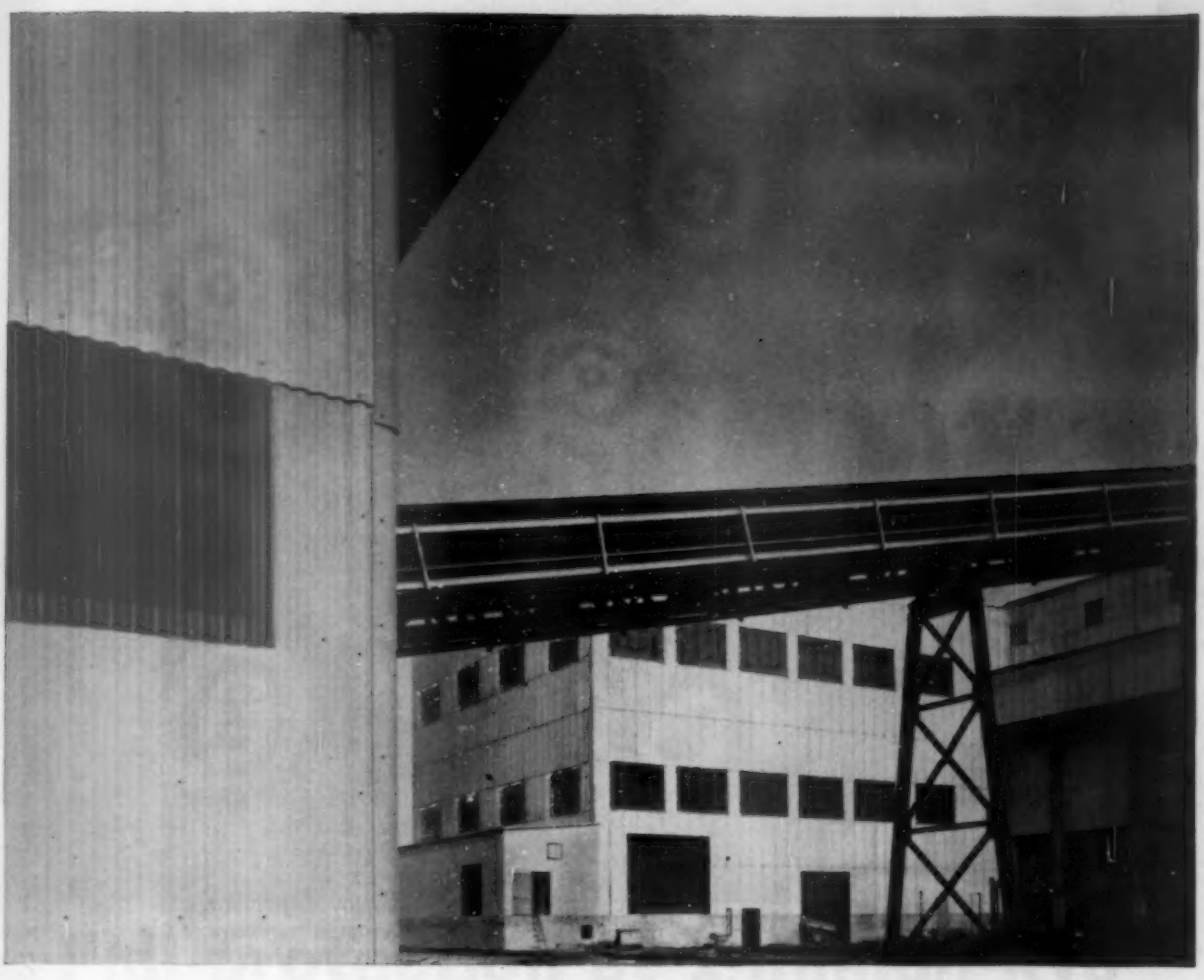
Indian-giving boss

Try taking a poll of your workers on how much they earn. Most will quote take-home pay, not gross pay. The withholding of taxes at the source obscures their total wages for many workers. This realization, reports *The New York Times,* prompted Goodwill Publishing Company (Gastonia, N. C.) to take steps to educate its employees.

Every pay day, hourly workers get 100% gross pay in their envelopes. Two hours later, the paymaster makes the rounds collecting federal, state, and social security taxes from each worker. All now realize the size of the tax bite.

(Editor's note: During contract negotiations, an adaptation of this procedure could show how much the company pays out in employee fringe benefits.)

Turn the page



Better light at lower cost because **J-M CORRULUX®** *provides*

SHATTERPROOF DAYLIGHTING

J-M CORRULUX IS an economically-priced, translucent building panel manufactured by Johns-Manville. It is made of weather-resistant, light-stabilized resins reinforced with high strength Johns-Manville fiber glass. Corrulux panels are noted for their shatterproof strength, resistance to industrial fumes, easy installation, long life and exceptional light admission.

J-M CORRULUX HELPS INCREASE EFFICIENCY. Although Corrulux admits up to 80% of the light striking it, the light is diffused. There is no glare to cause worker eyestrain. Transmission of sun heat is also reduced—a boon on hot summer days. A soft green color was chosen for the plant above. But there are 17 other colors, with varying light transmission qualities, for you to choose from.

J-M CORRULUX WORKS EASILY, CUTS COSTS. Exterior framing can be eliminated (see panel at left of photograph) because Corrulux panels handle as easily as the panels of J-M Corrugated Transite® which are used for the exterior walls of this plant. And when framing *is* required, Corrulux reduces it to a low-cost minimum. Corrulux can be sawed and drilled . . . bolted or nailed. Corrulux is also available in flat panes, which end window breakage problems forever when glass panes are replaced with shatterproof Corrulux Flat Panes.

WHERE YOU CAN GET CORRULUX. Three weights of Corrulux are available: Functional, Structural and Heavy Structural. For more details, look in the Yellow Pages under *Plastics*, or write to Johns-Manville, Box 158, Dept. F-1061, New York 16, N. Y. In Canada, address Plastics and Allied Products, Ltd., Dundas, Ont.

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from your regular plant crew

CAN MOVE YOUR HEAVIEST MACHINE

QUICKLY
EASILY
ECONOMICALLY

WITH...

MULTITON

ROLLER SKIDS

and suitable tractive power

The days of wasteful extravagant roller-bar moving are gone. With a set of MULTITON roller skids you can move any load up to 300 tons more quickly, more easily and at lower cost than by any method previously devised. The MULTITON roller skid lays its own track as it moves easily over smooth or uneven surfaces. . . . It will *swivel, turn, steer* and position heavy loads accurately in tight quarters.

LET US SHOW YOU how to slash moving costs and plant disruption. MULTITON skids will pay for themselves in ONE MOVE, and save thousands in the course of a year. Write for free catalog and 12-page booklet on *Modern Methods of Heavy Equipment Handling and Hauling.* A demonstration in your plant can be arranged—at no cost, of course. P.S. Ask about the Multiton Junior Kit for moving loads up to 6000 lbs.

STOKVIS MULTITON CORP.

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In Canada: Griswold Engineering Ltd., Montreal and Toronto

Begins on page 194

HUMAN RELATIONS

Plugged into negotiations

Management-employee communications took a giant step forward in at least two companies during recent contract talks. General Telephone Company of Indiana, Inc., Ft. Wayne, put one of its own products to work to give employees last-minute reports from the conference table. A telephone-answering service—the Electronic Secretary—spieled off recorded bulletins to 12,325 workers in about two months. They got the straight dope right from the horse's mouth just by dialing a specified number.

Timken Roller Bearing Company, Canton, Ohio, scooped the newspapers and radio with its bargaining table coverage. Daily discussions at the table were digested, printed, and mailed the same evening for delivery to employees mailboxes the following day. A complete verbatim transcript of the day's talks was also available to employees who wanted full details.

Keys: a key to your kingdom

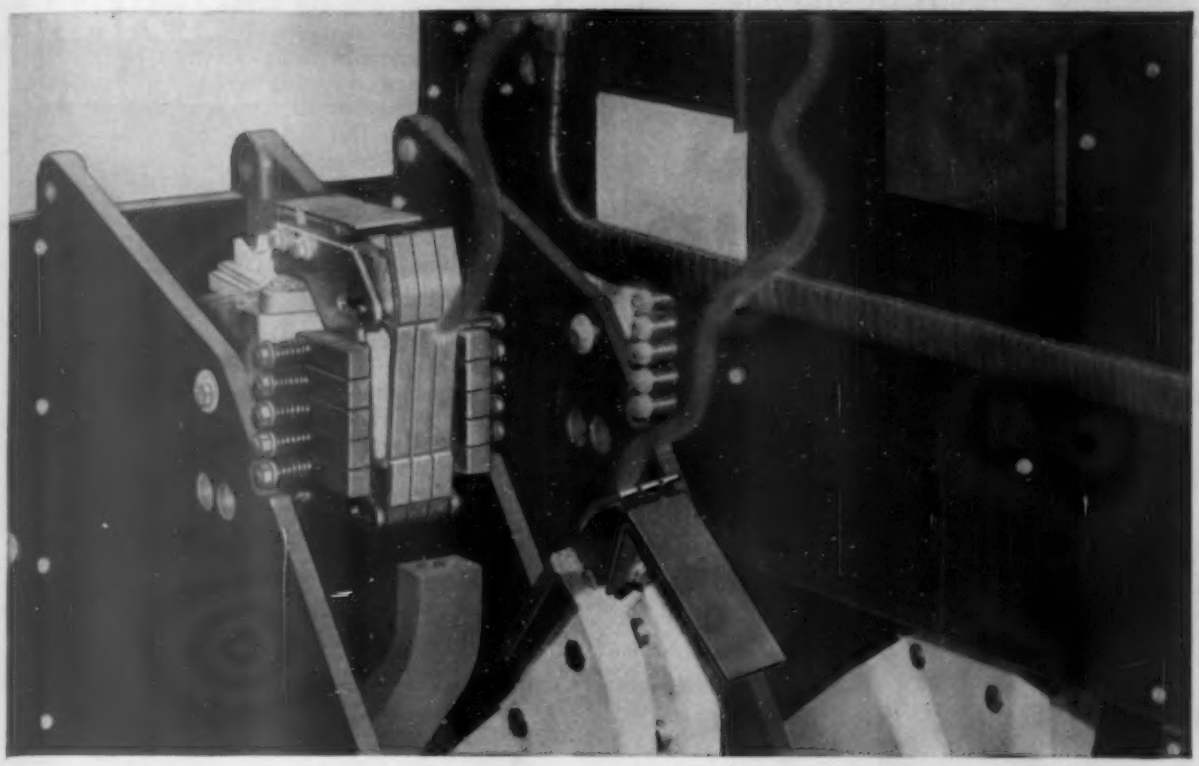
Status may be a question of boats and summer houses in general society, but in industry the keys have it. This is a warning to managers who, unknowingly, may be carrying status around on key rings.

You need a small number of "powerful" keys to maintain a high status image. The lower you descend on the status ladder, the greater the number of keys on your ring. These recent thoughts on the hierarchy of keys comes from Robert Sommer writing in *Worm Runner's Digest*, published by a psychology research group at the University of Michigan, Ann Arbor.

Want to know how you rate? This do-it-yourself formula, S = D/K, will set it down numerically. S is status; D, the number of doors you open to perform the job; and K, the number of keys you carry. The higher your S value, the greater your status. For example, a janitor uses 20 keys to open 20 doors, so he has a score of one. One key opening two doors for a secretary gives her a two score. A manager with six files or doors to open carries two keys which gives him a three score. But company presidents don't carry keys—there's always someone around to open doors for them. This raises their status rank to infinity.

Turn the page

ALLIS-CHALMERS



Full protection at 1 million kva

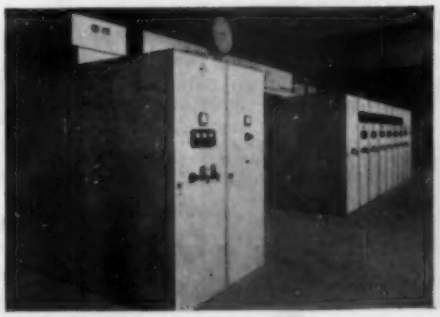
with this 15-kv maximum reliability metal-clad switchgear

New interrupting capability — 1,000,000 kva and below with *Ruptair* magnetic air circuit breaker in A-C 15-kv switchgear, means complete system and personnel safety.

Here are the *Full Protection* facts:

- Maximum reliability assured . . . insulation designed and tested to give utmost dielectric integrity.
- Breaker tested *in the unit* at *full* three-phase rating and beyond.
- Dead-front construction...the only self-locking front protective barrier.
- 3 hinges and 3 knurled screws strongly secure the front panel.
- *The ONLY switchgear with a front barrier and a front panel.*
- Front accessible current transformers can be inspected, maintained, replaced without exposure to any high voltage compartment.
- Enclosed service aisleway provided in the outdoor *Shelter-Clad* switchgear.
- Entire front panel can be used for meters and relays. Both stored energy and solenoid operators are available in a complete line of 5 and 15-kv switchgear. Simply installed, easily maintained, this new 15-kv switchgear now serves utilities, refineries, steel plants, and institutions. For product details, call, wire or write your nearby A-C office. A-1523

Tilted front steel barrier locks with cubicle to protect operator.



15-kv indoor metal-clad switchgear installed in a western utility.

Ruptair and *Shelter-Clad* are Allis-Chalmers trademarks.

For more facts Circle 508 on Reader Service Card

A Detex Guardsman Watchclock System...

KEEPS YOUR GUARD UP!

Find Your Nearest DETEX Inspector in The Yellow Pages

Tonight—when he is alone in your plant—will your guard be awake to the dangers of fire, theft, and vandalism? Insure the minute-by-minute protection you need and pay for. Supervise your security patrolman with a Detex Guardsman Watchclock System. The Guardsman's extra tape capacity assures positive supervision, even over long weekends. Supervisor need not return to the plant on Saturday or Sunday. Send for information today.

198 **For more facts Circle 509 on Reader Service Card**

Begins on page 194

HUMAN RELATIONS

Fasten your seat belts

Off-the-job safety is reaching campaign proportions in industry. Many companies have joined forces with the National Safety Council, American Medical Association, and Public Health Service to urge employees to install seat belts in the family car. After all, couldn't one car-pool accident on the way to the plant lay low up to six important cogs in the wheel?

One campaigner, Bethlehem Steel Company, is practicing what it preaches. It equipped about 140 company vehicles at its Lackawanna (N.Y.) plant with seat belts. And sent a special letter to all employees urging them to do the same with their cars.

Ansco Division of General Aniline & Film Corporation, Binghampton, N. Y., went Bethlehem one better. It is offering employees a choice of 11 colors in seat belts at wholesale prices.

Light touch beats hard sell

Are plant visits enhancing your company image in the eyes of the beholder? Or are they planned with the plant's rather than the community's interest in mind? For those guilty of the latter approach, Burson-Marsteller Associates, New York public relations firm, cites some survey findings.

Visitors do not want to be confused by the facts. By this is meant a mass of detail on plant operations delivered by various authorities during a long drawn-out tour. A formal atmosphere and the hard sell seldom win friends or influence people.

You can get Joe Citizen on your side by following this people-oriented procedure: Present a broad view of the plant, its people, operations, and products. Compare cost of machines and equipment in terms the layman can understand; i.e., tell him he could buy 10 cars with the price of this machine. Introduce the plant's role in the local economy and vice versa. And finally, provide your visitors with the chance to meet plant men for a free exchange of views.

The clincher to make that lasting impression is a giveaway. It could be a product sample, or literature describing the plant's place in the community. Do all this and you won't have to write that follow-up note signed by a plant VIP in indelible ink.

Circle 510 on Reader Service Card for items on next page

SPACEMAKER control at Stratman pumping station: (from left to right) 1. Auxiliary controls. 2. Fused disconnect switch (upper) and spare cubicle (lower). 3. Synchronous control. 4. Wound-rotor control (upper) and squirrel-cage control (lower).

New SpaceMaker control eliminates costly floor-rebuilding for St. Louis County Water Company

Privately owned St. Louis County Water Company serves more than 160,000 customers in a 225-square-mile area adjoining St. Louis, Mo. This progressive utility recently replaced an obsolete panelboard in a "cramped" pumping station with new *SpaceMaker* high-voltage motor control.

Allis-Chalmers new, exclusive two-high design enabled the utility to install all needed controllers in a single lineup. This permitted use of existing conduit without changes — thus saving cost of conduit relocation and floor reconstruction. Other controllers would have required a back-to-back layout.

Equally important: the single lineup of *completely* drawout front access controllers saved valuable aisle space.

To learn more about the *exclusive* cost-cutting, space-saving features of *SpaceMaker* control, contact your A-C representative or write **Allis-Chalmers,** Industrial Equipment Division, Milwaukee 1, Wis.

SpaceMaker is an Allis-Chalmers trademark.

Single cage controller in compact enclosure measuring 45 inches high, 36 inches wide and 32 inches deep.

ALLIS-CHALMERS A-C A-1532

You can count on . . .

LINCOLNWELD SUBMERGED ARC WELDERS

Here, 16 **Lincolnweld** heads operating simultaneously make eight, 85-foot double-fillet welds which join stringers and center plate to railroad car deck plates. No other process could do this job so well, so fast.

ERS FOR PERFECT STARTS EVERY TIME

Photo on the left shows an expensive, fully-automated submerged arc setup with 16 welding heads. Press the button. Can you count on every arc to start perfectly? Every time? This manufacturer can. He chose **Lincolnweld** equipment. Because he knows its welding dependability, ruggedness and easy serviceability will protect his investment and guarantee production by consistently delivering good welds . . . fast . . . at low cost.

Here, single LAF **Lincolnweld** head is used to make large fillet welds on bridge sections at speeds not possible by any other process. Note conveniently-mounted controls which let operator govern process at all times. No involved electronic circuitry to get out of order. Components are easily serviced by shop electricians. Lincoln automatic submerged arc heads are made for AC or DC welding, in shop or in the field; can be used singly or in various combinations to get higher speeds, lower-cost welds.

For short production runs, manual **Lincolnweld** gives you the benefits of submerged arc welding . . . continuous wire feed, high speeds and deep penetration . . . without the expense of fixturing. Here, ML-3 gun, propelled at pre-set speed by serrated wheel resting on work, provides a degree of mechanization and control not possible with manual welding.

Parts with unusual configurations were once welded exclusively by stick electrodes. Now, however, you can take advantage of submerged arc welding even on these kinds of joints with the ML-3 or the ML-2 shown here because of their inherent versatility. Result? Higher speeds, lower costs, better quality . . . at low initial capital outlays. See **Lincolnweld** submerged arc equipment in action. Contact your local Lincoln field engineer, a specialist in welding. Or, write for information on this equipment now.

THE LINCOLN ELECTRIC COMPANY • DEPT. 1851 • CLEVELAND 17, OHIO

LINCOLN WELDERS

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT AND ELECTRODES

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LABOR RELATIONS NEWS

By Paul King

Noted Labor Relations Authority
Member, New York Bar

Runaway employers can't escape unionism

Unions' efforts to move into unorganized areas have received aid from two federal courts. Plants on the move must take their union employees with them.

A recent decision of a U. S. District Court in Michigan sent union leaders scurrying to the union (the United Automobile, Aircraft and Agricultural Implement Workers, UAW) and company attorneys to the company (Ross Gear and Tool Company) to confirm what they would have preferred not to have read.

Is it true, they asked, that if you move your plant—even several hundred miles away—you must take your union employees with you? Will the decision stand up? If it does, won't companies think twice before they move southward for lower taxes, subsidized buildings, and a union-free labor situation? And unions, isn't it true, will hardly think at all before they start an injunction action to restrain a move away?

The union men were told by both sides to read the decision again and believe their eyes. It's for real. Moreover, this is the second federal case to hold the same way. The Michigan court, taking its cue from a decision handed down in a similar case by a U.S. court of appeals in New York (Zdanok vs. Glidden) put it in legal writing that seniority rights are vested. Furthermore, they are not terminated when the union contract terminates. It's the same plant, the court reasoned, wherever it may be moved—even if known by a different name. Mere change of form will not change the substance, nor will a change of location. The same machinery will be used; it will have the same officers and supervisors—only the climate will be changed, explained the court.

But what about the termination of the contract? Doesn't all end when the contract ends? No, ruled this pioneering court:

"The mere fact that there is a termination date in a collective bargaining agreement does not terminate all the rights and benefits of the employees under that agreement, but merely designates a certain time agreed upon by the parties when there would be further negotiations concerning these rights and benefits.

Turn the page

TAKE IT FROM KING . . .

Q. When I talked to an employee at his bench about his poor performance, he got sore and hauled off and punched me in the mouth. A few seconds later, he hauled off again. I fired him on the spot. Now the union claims I "provoked" the fight by "pointing" my finger in his face, and that if he is not reinstated at least the penalty should be reduced to a suspension since it was his first offense. What will the arbitrator say? J. R. T.—Shop Foreman

A. When "supervisors" turn into "supermen" they'll stop pointing fingers (will realize that it makes big workingmen feel like little boys). Nevertheless, few arbitrators would say you provoked the fight. Also, employees should not be entitled to a second crack at their supervisors. It's bad for supervisory morale—and plant discipline. Under the facts you give, the discharge should be upheld.

Q. If the union contract says an employee may be discharged for incompetence, can he be suspended or demoted instead? J. L.—Time Study Supervisor

A. If he is downright incompetent—and not lazy—you'd be better off firing him. But it's okay to suspend or demote him since most arbitrators will reason that if you have the express right to impose a greater penalty, you also have the implied right to impose a lesser penalty. However, I know of only one such case where the employee was demoted.

Q. I am told that when government contractors advertise for help, they must say that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin. In addition to the cost of the extra linage, this mouthful wrecks the appearance of the ad. Any ideas? L. P.—Employment Supervisor

A. Have you seen the new rules issued by Jerry Holleman, executive vice chairman of the Committee on Equal Employment Opportunity? Among the approved short-cuts is this statement: "An equal-opportunity employer." Another angle: Your newspaper can run the caption (at its expense, of course) as a headline applicable to a group of ads.

(Each month Paul King will answer selected labor relations questions of general interest. No replies will be made other than those published. Write Mr. King, FACTORY, 330 W. 42nd St., New York 36.)

...SPEED UP CHECK WEIGHING WITHIN SPECIFIED TOLERANCES

FAIRBANKS-MORSE "OVER-UNDER" SCALES

For check weighing requirements that permit a tolerance, over or under, of ½ ounce or more, the F-M Floaxial "Over-Under" Dial Scales are the answer. Specifically designed for check weighing within close tolerances, these units, in most cases, provide the widest spaced graduations with consequent easier reading, than any other like units.

Two types are available: The F-M Bench Dial Scale and the F-M Portable Dial Scale. The simple, compact Bench Scale is rugged and lightweight... available in various sizes with capacities from 130 to 800 lbs. The Portable Dial Scale, ranging in capacities from 325 to 800 lbs., has smooth-rolling rubber wheels for easy movement.

Electrical and electronic controls and signals to suit your check weighing requirements can be furnished. Both the Bench and Portable "Over-Under" scales have main and fractional tare bars and the direct-reading F-M "Floaxial" Dial that eliminates knife edge or pin point pivots.

For more information on either the bench or portable model "Over-Under" scales, write: **Dept. S-1; Scale Division; Fairbanks, Morse & Co., 100 Electra Lane, East Station; Yonkers, New York.**

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Now! Powasert Feeder makes portable automatic nailing more reliable than ever

Nails fed to driver by improved high-speed, free-flow raceway. Includes many reliability features developed from over 2,000 units now in the field. No spilling or flipping. Positive driving action at all times. Powasert Portable Nailing Machines now saving companies hundreds of dollars by driving low-cost bulk nails with remarkable speed and efficiency. Up to 120 per minute, greater holding power, more accuracy, greater safety. Available for nail sizes from ½″ to 4″. Let Powasert pay off for you, too. Send for details: Powasert Department, United Shoe Machinery Corporation, 140 Federal Street, Boston 7, Massachusetts.

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Begins on page 202

LABOR RELATIONS

"Therefore, the fact that this agreement in question has a termination date does not automatically remove all of the rights and benefits previously acquired by the employees. Although . . . the agreement itself with the union as a bargaining agent might have been terminated by the move . . . the rights and benefits that have accrued to the individual employees persist and cannot be unilaterally denied by the employer without the employee's consent. Among these rights and benefits would be included the right of seniority or, as more specifically involved in this case, the right to be rehired by the employer after a layoff."

The runaway plant is not a new phenomenon. Courts and arbitrators have beckoned runaway employers back to home base where their motive was to escape unionism. What is new here is that an anti-union motive apparently need not be shown. Dwight P. Joyce, president of Glidden Company (the defendant in the first case) stated: "We did not close our Elmhurst plant and begin operations at Bethlehem to 'run away' from a group of employees, as some companies have done. We did so for sound business operating reasons." "We'll appeal to the U. S. Supreme Court," promised Joyce. On July 21 the company filed legal papers.

These decisions are bad enough. They'll knock out attempts to be more competitive. As Joyce pointed out: "Plant closings are commonplace in industry today, when American business is working to meet foreign competition and hold down the costs of goods and services. Industry must have the flexibility and freedom to do what is necessary to remain competitive and to operate successfully."

However, there's a worse development in prospect: Other courts may go a step or two farther. They may require companies to pay transportation costs of employees.

And what about paying the same wages? If the contract has expired, presumably a lower wage can be paid in the new location. But fearful employers reason: A well-heeled union can subsidize transferred

Move bulky, heavier loads faster . . . with one man and a Yale G-3 Gas Truck. Low center of gravity, and a heavily constructed frame give stability previously impossible in trucks of this capacity. Widely spaced dual lift cylinders provide maximum visibility greatly increasing safety and operator efficiency.

It's time to put the squeeze on the profit squeeze

Get up to 30% more use of present space. Yale's new Warehouser models let you reduce aisle space to as little as 6 feet, get maximum use of potential square and cubic storage space. Yale's Extend-A-Load model handles various widths of loads, because different size pallets and skid bins can be handled without nesting between outriggers. Extend-retract device designed for low over-all height saves space in high stacking.

Time to tighten up on wasted space, wasted manpower, production delays, high maintenance costs and other serious losses growing out of an obsolete materials handling program. The key to plugging these losses and protecting profits is the right truck for the job — gas, electric, hand, LP-Gas — large or small.

When you modernize with Yale materials handling equipment you draw on the broadest line in the industry . . . get the *right* truck for your job without biased recommendations or need to compromise on a model that "comes nearest" your requirements. You get Yale advanced design, too, with many exclusive features as standard equipment . . . in units that step up operator efficiency, give faster lift and travel speeds, stack higher in narrower aisles and cut maintenance costs.

Comprehensive user arrangements include Yale *rental* plans for peak load situations, flexible *leasing* and *finance* plans. Call your Yale representative for details. Or write: Yale Materials Handling Division, Dept. G-107, Philadelphia 15, Pa. A Division of The Yale & Towne Manufacturing Company.

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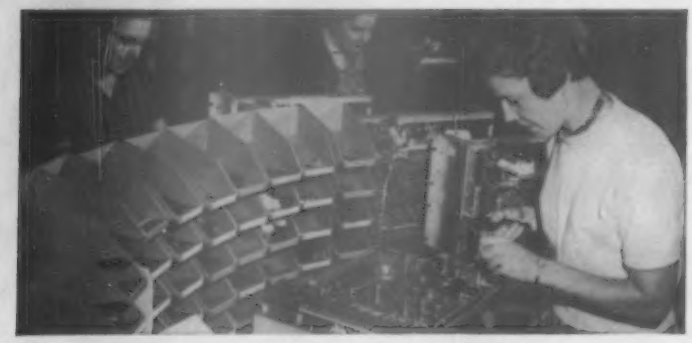
Stackbin's all-plastic bins provide fast, flexible assembly stations



New, non-corrosive, easily cleaned... stack and restack securely in tight semi-circular arrangement to suit changing requirements . . . molded card holders on fronts for fast, easy parts identification . . . sloping bottom for easy parts accessibility.

Custom fitting, plastic insert doubles the number of different components you can handle without increasing space requirement.

FREE FACTS Write for new product bulletin and prices. All Stackbin products sold direct.

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STACKBIN® SYSTEM
"Stacked and Still Accessible"

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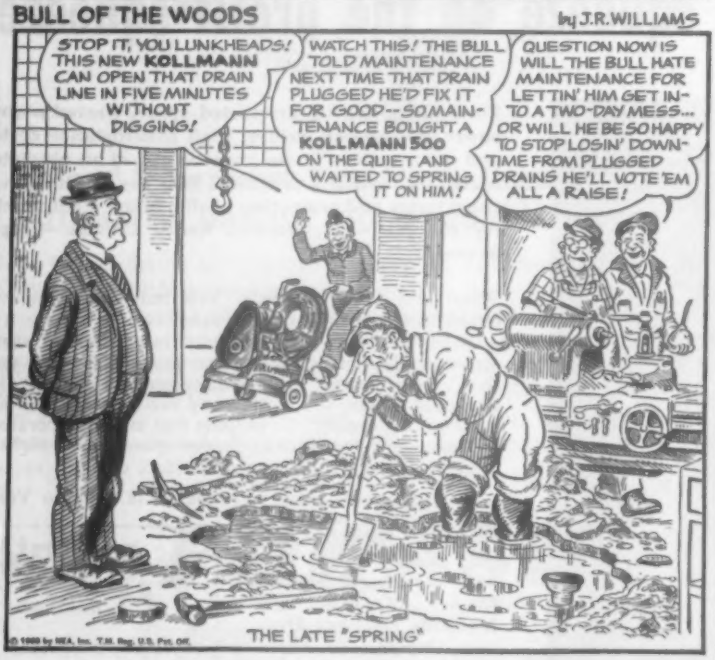
BULL OF THE WOODS by J.R.WILLIAMS


STOP IT, YOU LUNKHEADS! THIS NEW KOLLMANN CAN OPEN THAT DRAIN LINE IN FIVE MINUTES WITHOUT DIGGING!
WATCH THIS! THE BULL TOLD MAINTENANCE NEXT TIME THAT DRAIN PLUGGED HE'D FIX IT FOR GOOD--SO MAINTENANCE BOUGHT A KOLLMANN 500 ON THE QUIET AND WAITED TO SPRING IT ON HIM!
QUESTION NOW IS WILL THE BULL HATE MAINTENANCE FOR LETTIN' HIM GET IN-TO A TWO-DAY MESS... OR WILL HE BE SO HAPPY TO STOP LOSIN' DOWN-TIME FROM PLUGGED DRAINS HE'LL VOTE 'EM ALL A RAISE!

THE LATE "SPRING"

Many of the "big names" in American industry save money and nuisance with Kollmann power drain cleaners

The 500 is "worth its weight in man hours" saved annually. Fast, rugged, operated by one man. Quickly drives through chips, congealed oil, grease, rags. Up to 200' through traps in lines from 4" to 10"... and can be adapted for 1½" & 3" lines. *Write for particulars.*

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MANUFACTURING CO., Inc.
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Begins on page 202

workers (at least the ardent unionists) and promise that if they go south, for example, and vote for the union, wages will be upped eventually. What this can amount to—where companies have committed themselves to a move—is an opportunity for unions to get their hooks into unorganized territories.

Subcontracting

Its current status is analyzed in a BLS article, but a federal court decision comes up with a definitive analysis of its own.

Analyzing how arbitrators have handled management's right to subcontract, Leon E. Lunden, Bureau of Labor Statistics, notes in an article in the Bureau's June *Monthly Labor Review* these results:

1. If management's right to subcontract is to be abridged, a specific clause to that effect would have to be included.

2. Subcontracting is barred where it would violate the recognition clause, seniority clause, or other general provisions of the contract.

3. In the absence of a contract clause prohibiting subcontracting, there is still an implied limit on subcontracting but not an absolute prohibition.

A U. S. district court at Wisconsin ignored arbitration precedents to the contrary, and interpreted the U. S. Supreme Court's decision in the Warrior and Gulf Navigation Company case as having upset prior decisions of most federal courts. The Wisconsin court ruled that an employer may not subcontract work within classifications covered by the contract unless a specific clause allows him to do so. The company, Webster Electric, by laying off three janitorial employees locked them out in violation of the contract, reasoned the court. Where would a management right to subcontract lead, it queried. "If the defendant is permitted in this instance to lay off the janitors, then tomorrow it could lay off all the other company employees and replace them by use of the subcontract formula."

Lunden, too, in his carefully prepared report on subcontracting won-

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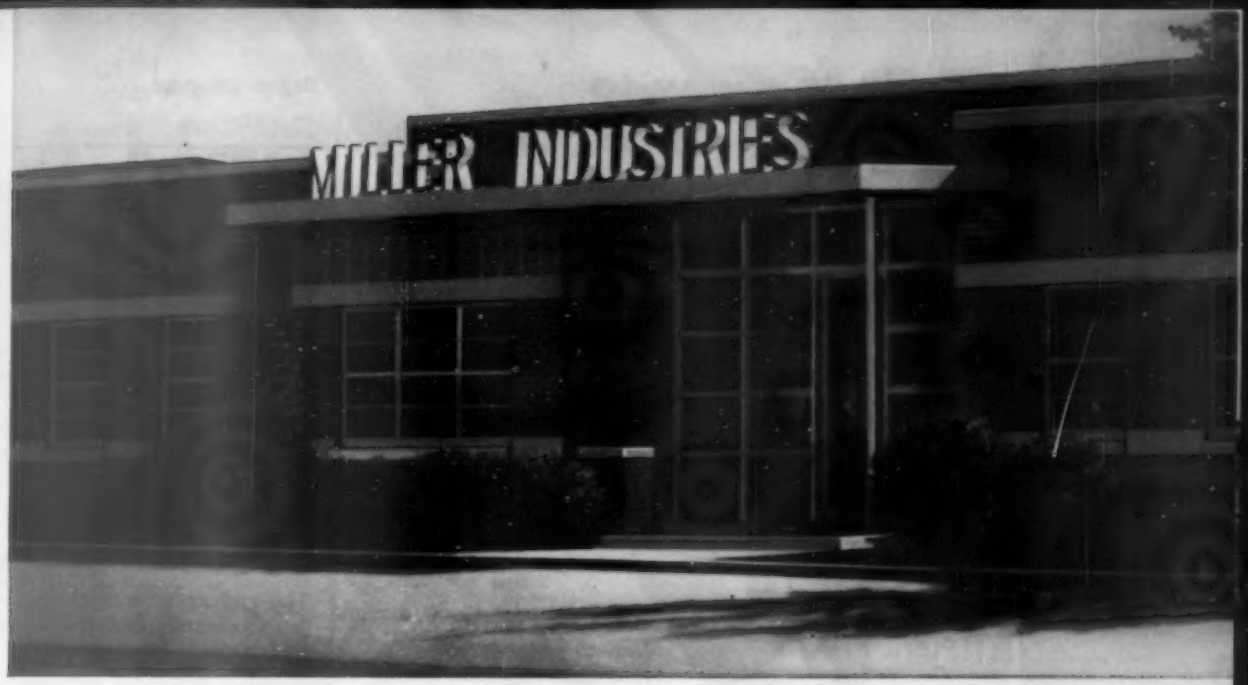

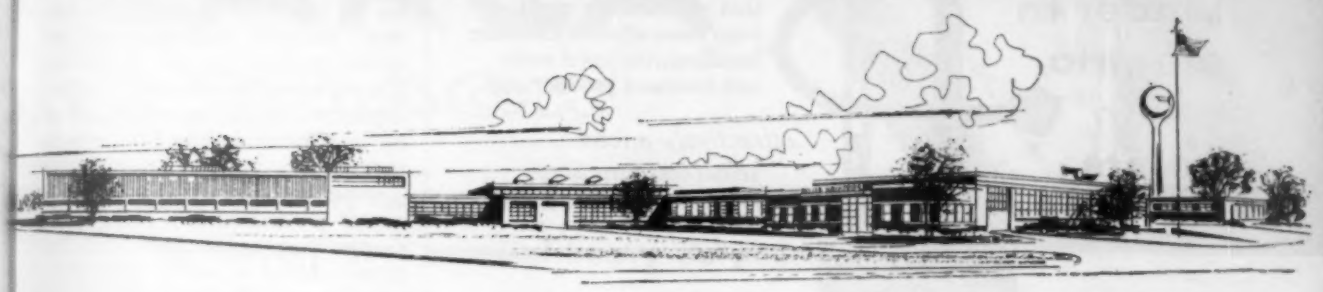

Anodizing production increased, finish improved

"In our previous method of anodizing (i.e. before Acme), the acids would build up heat and we'd have to stop anodizing to allow the acids to cool back down again. Not any more. Now, with our Acme packaged chillers, we can hold our acid bath solutions at constant low temperatures . . . no more production stoppages for cooling off periods. In addition, precision control, plus the colder temperatures we can now maintain, gives us a more uniform, harder anodizing finish." So states Larry Miller of Miller Industries, Inc., Reed City, Michigan, fabricators of aluminum products . . . and he added "We're very well satisfied with our Acme chillers."

Acme packaged chillers *are* ideal for plating applications. They're ideal, for that matter, for a host of industrial cooling jobs. They pack high capacity and cooling efficiency in a compact unit . . . compactness that allows you to install an Acme chiller most anywhere (see, top left, where Miller tucked one of their two 60-ton units). Then there's Acme packaging to simplify installation . . . Miller people installed their chiller themselves. Top it off with a complete line . . . an Acme chiller for every requirement . . . plus Acme's factory-certified performance guarantee and you can't do anything but win with Acme.

Acme INDUSTRIES, INC.

JACKSON, MICHIGAN • GREENVILLE, ALABAMA

MANUFACTURERS OF QUALITY AIR CONDITIONING AND REFRIGERATION EQUIPMENT SINCE 1919

For more facts Circle 517 on Reader Service Card

Leads the way to DEPENDABLE LIFTING

...quality leader in electric chain hoists

performance... the real test

Many thousands in all types of service demonstrate that you, too, can profit from more efficient Lodestar handling...at lower costs and increased productivity.

attractively priced...

Initial cost surprisingly low...operates for pennies per day...built to serve you without costly maintenance.

end your hoist problems...

Select Lodestar from a complete range of capacities and speeds...⅛ to 2 tons and 8 to 60 fpm. Interchangeable lug, hook and trolley suspensions.

Outstanding Lodestar® features include...

CONVENIENT PUSH BUTTON OPERATION – Precise and safe load control.

LOWEST HEADROOM – For highest lifting... unmatched by any other hoist of similar type.

HEAVY DUTY PERFORMANCE – Ruggedly constructed to withstand the heavy demands of severe service.

DEPENDABLE DUAL BRAKING – Instantaneous acting, self-adjusting magnetic brake, plus ultra-modern regenerative electric braking.

FLEXIBLE WELDED LINK CHAIN – Famous CM-ALLOY type flexes freely in all directions... permits angle lifting ...easily inspected... extremely long wearing.

MINIMUM MAINTENANCE – Introduces new standards of maintenance-free service.

Request catalog and name of local stocking distributor

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CHISHOLM-MOORE HOIST DIVISION
Columbus McKinnon Corporation
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CHICAGO • CLEVELAND • SAN FRANCISCO
In Canada: Columbus McKinnon Limited, St. Catharines, Ont.

Begins on page 202

ders where management's right to subcontract is going. His two-part study of the subject is based on an examination of 1687 major collective bargaining agreements covering about 7.5-million workers. The first installment deals with subcontracting of construction, maintenance, and installation services. The July 1961 installment discusses provisions and their enforcement.

Grievance machinery

The grievance machinery described in the contract cannot be tampered with.

If the grievance machinery calls for the supervisor to act as "the first step," that's it. Neither he nor the union steward can be by-passed. The personnel or industrial relations department cannot be substituted, as far as Arbitrator Peter Seitz is concerned.

When last winter's blizzards disrupted production at a New Jersey Curtiss-Wright plant, over 6000 employees failed to report. The company by-passed supervisors in settling employee claims for sick pay. It worked directly through the industrial relations department.

No can do, ruled Peter Seitz.

Overtime twice-over

Paying for overtime twice is good cause for a fast burn—but if foremen are on their toes, it can be avoided.

Overtime is costly—but often necessary. Paying for it twice is that much more costly—and absolutely unnecessary—*if* foremen closely watch the P's and Q's of the union contract. But foremen can forget, too. A better remedy, if you can get the union to go along with it, is to fix the overtime clause so you won't be penalized by foreman oversight.

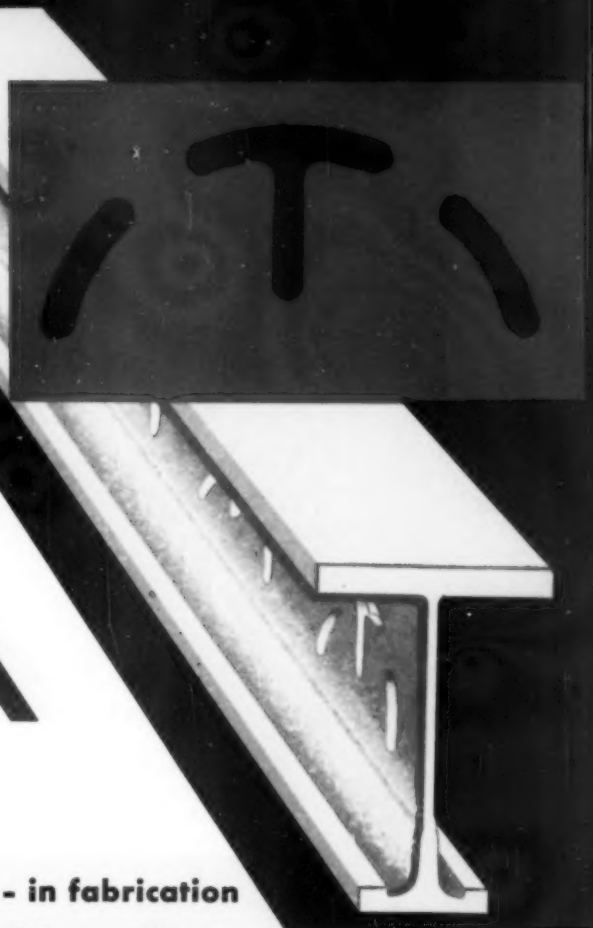
The overtime clause of an air conditioning company called for equitable distribution of overtime over a 12-month period. It also provided that initial overtime must be offered first to the most senior employees.

Turn the page

For more facts Circle 518 on Reader Service Card Circle 519 on Reader Service Card for items on next page

A NEW HEAVY-DUTY OVERHEAD TRACK BY CLEVELAND TRAMRAIL

TARCA TRACK



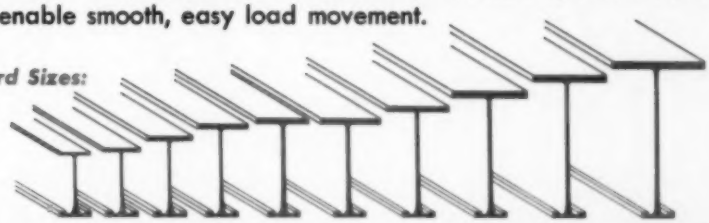
- **Completely new - - in design - - in fabrication**
- **Assures more years of heavy-duty service**
- **Great rigidity** ■ **Maximum strength with minimum weight**
- **Design readily proportioned to suit any load condition**
- **Overcomes track peening** ■ **Greater range of sizes**
- **New support fittings expedite erection**

Cleveland Tramrail Tarca Tracks are a tremendous innovation in the overhead materials handling field. Another great improvement among many by Cleveland Tramrail to keep it far in the lead.

Tarca Tracks are straight, true, accurate—have flat raised treads—of hard, high-carbon alloy steel—prevent peening—provide greater wear resistance—enable smooth, easy load movement.

Tarca Tracks are made under carefully controlled conditions. The three parts, top flange, web and alloy steel rail, are joined by continuous welds to form an integral one-piece section.

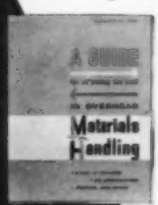
10 Standard Sizes:



Sizes range from 8" to 20". Also special sizes are easily made to suit any overhead crane or monorail requirement. Tarca Track matches with existing Cleveland Tramrail track installations.

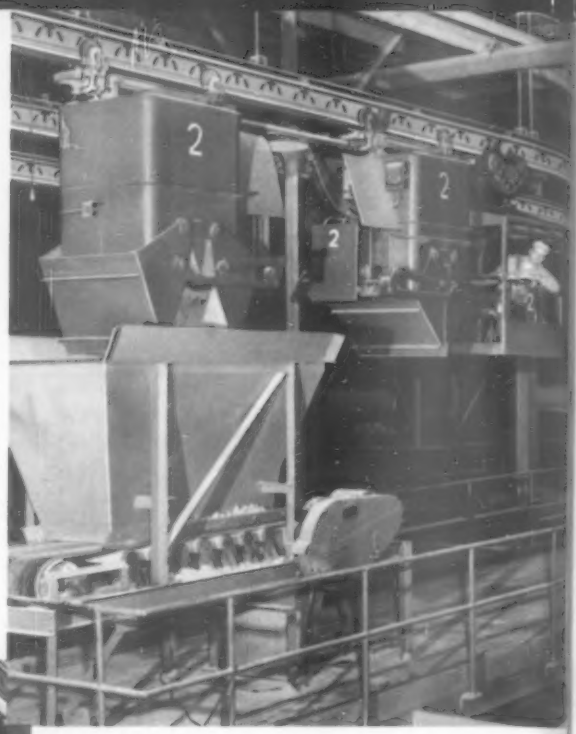
Ask for this helpful booklet—No. 2032

Covers all major features the buyer should know about overhead materials handling equipment. Has complete story on Tarca Track. Contains detailed equipment specifications and handy proposal evaluation form.

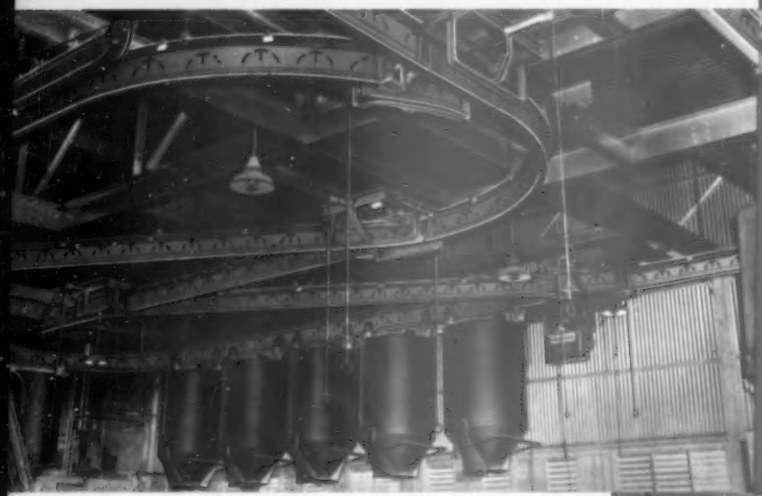


CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO
5899 EAST 284th STREET · WICKLIFFE, OHIO

Trade—mark of durability and strength —punched into all Tarca Tracks.

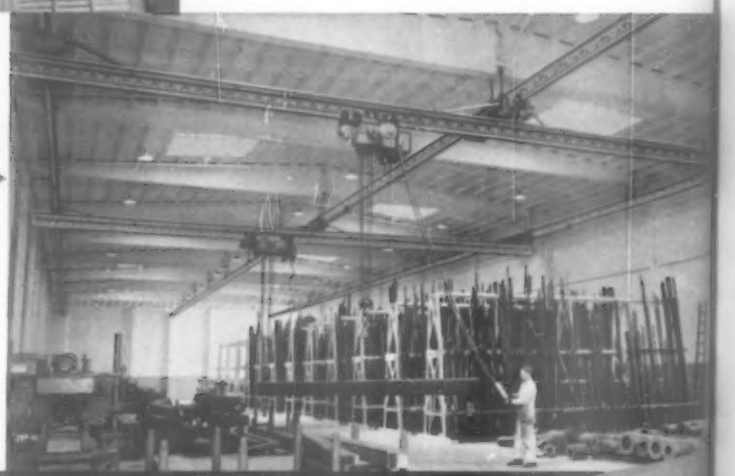


Cleveland Tramrail has an enviable reputation throughout the Ceramic Industry for outstanding performance. Customers have reported that their installations subject to heavy, continual usage are serving them far beyond expectations.



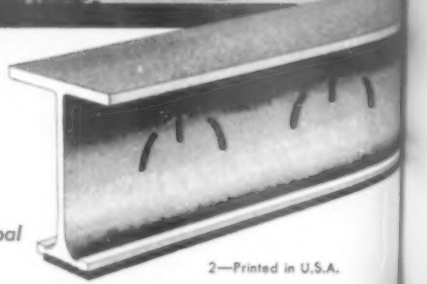
In the Glass Industry Cleveland Tramrail advanced a method of handling mixed ingredients in buckets traveling between mixer and furnaces which prevents segregation. This has proven so successful in assuring uniform quality that today the entire production of many glass plants is dependent upon equipment like that illustrated here.

Cleveland Tramrail floor-operated cranes are such an important factor in handling heavy materials and cutting costs that there are now thousands of installations serving factories, mills and warehouses. Tarca Track is of real advantage for crane systems because of its great resistance to deflection.



Your Cleveland Tramrail Sales Engineer is Qualified to give you the Complete Design and Application Story on This Revolutionary

NEW TARCA TRACK



Cleveland Tramrail is represented by competent, experienced engineers in all principal cities of the United States and Canada. Contact address on other side.

2—Printed in U.S.A.

Begins on page 202

This time it wasn't. The company offered the overlooked employees the next overtime opportunity. Sounds fair enough?

Not to Arbitrator Samuel Edes—or a good many others. How come? "The basic principle applied in arbitration—in the absence of a specific remedy in the contract as to the nature and form of remedial action to be followed to correct a contract violation—has been to restore the employee who has been adversely affected as nearly as possible to the position he would have been in had the contract not been violated." Suppose the seniority bit had been dropped from the clause? Would that have helped? Absolutely.

No strings to withdrawals

A union may withdraw a grievance without prejudice before a scheduled arbitration hearing. But it cannot tie any strings to it.

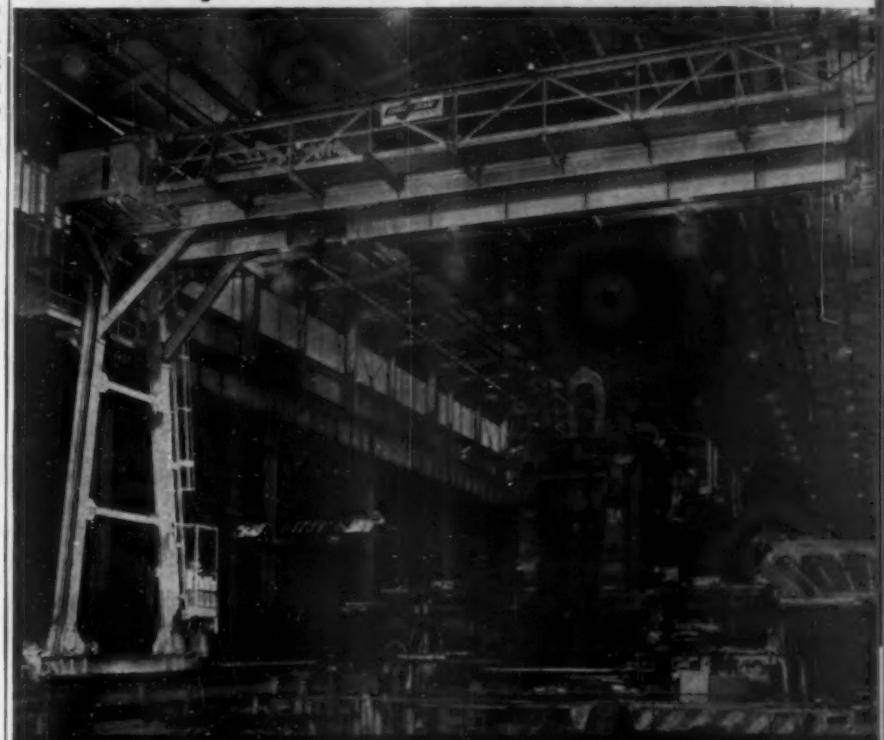
In this unusual case, it's hard to tell whether or not the employer actually got what he wanted from the arbitrator.

The union withdrew a grievance prior to the scheduled arbitration hearing—without prejudice. But in its letter of withdrawal, the union insisted on its initial position—that the grievant was entitled to bid for a lower-rated job. Subsequently, union bulletins reminded employees that the company had been wrong in denying the job to the grieving employee. "Withdraw it and forget it, or don't withdraw it and argue it out at the hearing," was what the company wanted, and it soon tired of the union's constant bull-dogging. To Arbitrator Harry Dworkin went the job of determining: Has the union the right to withdraw a grievance prior to arbitration over the protest of the company? And can the union withdraw it with the sort of qualifications imposed here?

A union can withdraw a grievance without prejudice any time, ruled Dworkin, but it may *not* attach conditions or qualifications to its dismissal. If it does, the qualifications are not entitled to be "accorded any substantive effect." We think he

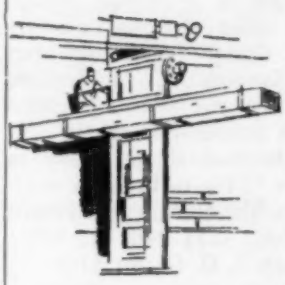
CONCO
OVERHEAD
TRAVELING
CRANES

in capacities to 150 tons



Conco Semi-Gantry Crane
custom-engineered for service
in a Chicago area steel mill

CRANES HOISTS CONCO



Write for Crane Specifications Tablet containing five sets of general service crane specification data and forms.

For information on Conco Cranes, Hoists and Trolleys Request Bulletin 5000B

Material Handling Division
CONCO ENGINEERING WORKS, INC.
Mendota, Illinois

AFFILIATES:
SPARTAN TOOL DIVISION, Powered Sewer Cleaning Equipment
FIELD CONTROL DIVISION, Barometric Draft Controls
CONCO BUILDING PRODUCTS, INC., Brick, Tile, Stone.

CHICAGO TRAMRAIL, manufacturer of "Trak-Rak" Stacker Cranes, Monorail Systems, and "Fas-Lok" Storage Racks at 1330 S. Kostner Ave., Chicago, is now a DIVISION OF CONCO ENGINEERING WORKS, INC.

For more facts Circle 520 on Reader Service Card

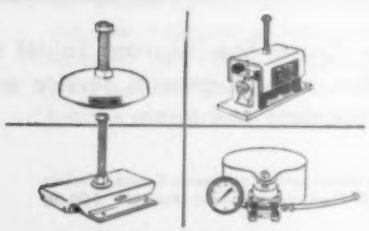
ARE YOU *JUST 4 FEET* FROM EFFICIENCY?

If you have bolted the 4 (or more) feet of your machinery to the floor, you're missing the production efficiency that results from layout flexibility!

With your machinery feet on BARRYMOUNTS®, your own maintenance people can rearrange production lines *quickly*, and without worrying about shock, vibration or noise problems.

Only Barry can offer you *quality-engineered* machinery mounts to answer your particular needs. Three different resilient elements: neoprene, helical springs or air provide the versatility required for every mounting requirement. In addition, you get built-in leveling . . . machine mobility . . . and freedom from shock and vibration effects.

Barry's experience can help you gain higher production efficiency. Why not request a copy of Bulletin 60-04A, "Practical Considerations When Installing Machinery"?



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SHOCK • VIBRATION • MACHINE EFFICIENCY

Division of Barry Wright Corporation

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1400 FLOWER ST., GLENDALE, CALIF.

212 Circle 521 on Reader Service Card

Begins on page 202

LABOR RELATIONS

meant—in such a case—the issue is not decided; it would have no binding effect on future grievances.

Nice award, but was this really what the company wanted? We doubt it. Some kind of injunction preventing the union from shooting its mouth off is what it probably looked for—but didn't (and probably couldn't) get.

Insurance costs

They're none of the union's business if your plan is a non-contributory one.

Sylvania was proven right, the United States Steelworkers and the NLRB wrong. The U. S. Court of Appeals in Boston upheld the company's refusal, during contract negotiations, to reveal current premium rates and the amount of premiums paid in a non-contributory insurance program. The court distinguished between contributory and non-contributory plans. The obligation existed in the first case because the payments were *wages*, but not in the second.

However, if the company had pleaded inability to pay, it would have had to furnish the data—unless it was unduly burdensome to do so.

Witnesses

Talk to your witnesses before the hearing is a sound rule.

No matter how good your case appears to be, the hands-down arbitration case is a rarity. Unions (and arbitrators too) have a way of springing their little surprises.

One step not to be overlooked in preparing your case is to talk to your witnesses before the hearing. Boaz Siegel, in a 48-page A-to-Z pamphlet called "Proving Your Arbitration Case," points out that "among lawyers it is a cardinal principle that no witness is called for direct examination whose version of the facts is not known to the lawyer." (The pamphlet is available from The Bureau of National Affairs, Inc., 1231 24th St., N.W., Washington 7, D. C., for $1.)

If you have a tough application for

CASTERS & WHEELS

Specify **DARNELL**

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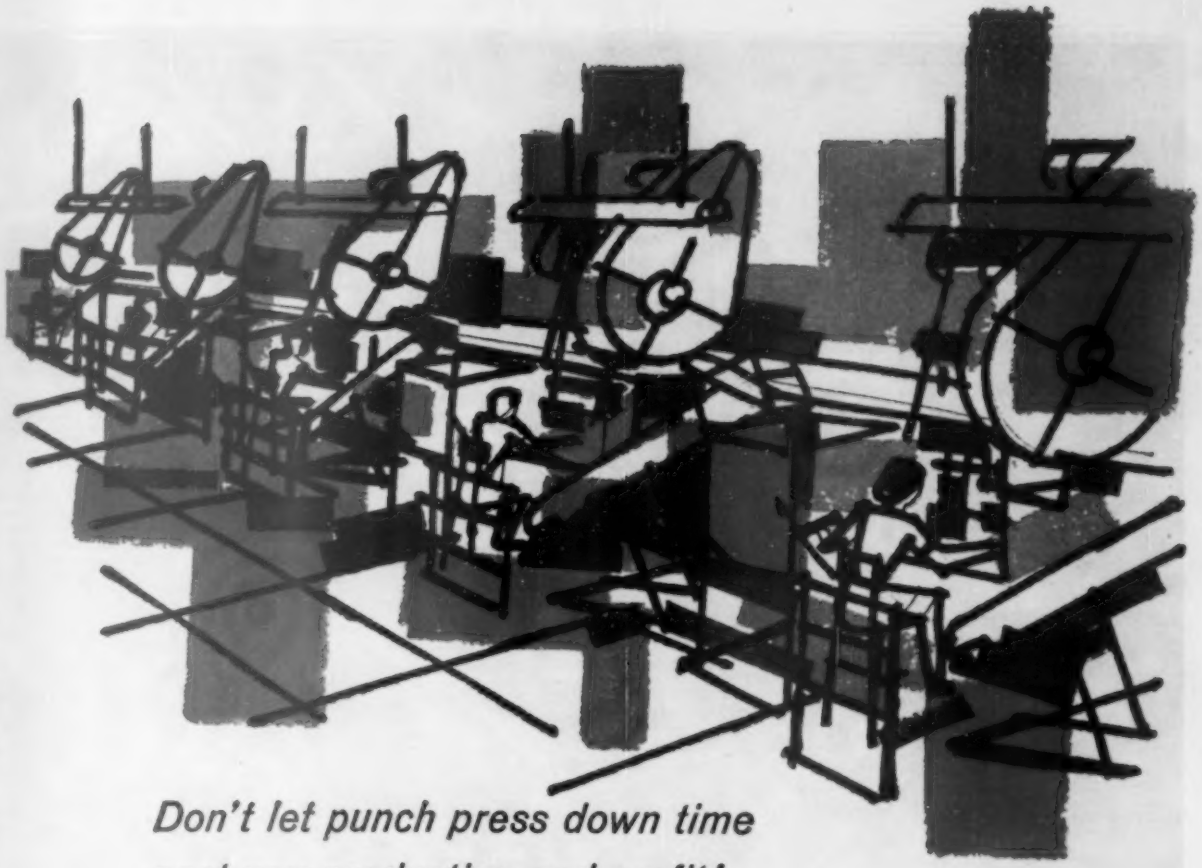

Don't let punch press down time cost you production and profit!

Install ALEMITE CENTRALIZED LUBRICATION

Only Alemite has all four Centralized Lubrication Systems... one of them is just right for your punch press or machine needs:

ACCUMITE – small, easily installed system gives positive measured shot of oil or light grease to each bearing.

ACCUMATIC I – simple, single line system for oil or medium weight grease. Wide range of valve capacities.

ACCUMATIC II – twin line system can easily handle every heavy grease that can be pumped.

ALEMITE OIL-MIST – delivers air-borne oil mist to every bearing to lubricate, cool, shut out dirt and grit.

When a punch press has to "knock off" to be lubricated, expensive man and production hours are lost all the way down the assembly line. Not so with an Alemite Centralized Lubrication System! All points that need lubrication get it—*automatically and economically.* Production never stops. Machine life is extended. Breakdowns and excessive wear are minimized. Centralized systems get the most out of lubricant used, keeps it clean since it is applied, through tubing, in measured amounts to prevent waste and product contamination.

For complete details on one or all four systems, write today!

Symbol of SW Excellence

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DIVISION
STEWART-WARNER
CORPORATION

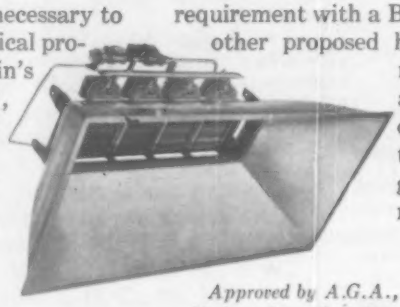
Dept. B-101, 1850 Diversey Parkway, Chicago 14, Illinois

In Canada: Stewart-Warner Corporation of Canada, Ltd., Belleville, Ontario

300 (48,000 BTU/H) Perfection Schwank Gas Infra-Red Heaters Mounted at a height of 36 ft., heat the area of 100 ft. wide by*

J & L Steel Saves 46% in BTU's wit

Minimum 55° machinery temperature is necessary to guarantee peak operating efficiency of critical production equipment at Jones & Laughlin's **No. 1 Continuous Weld Pipe Mill, Aliquippa, Pa.** Replacing their previous **heating equipment, 300 Perfection Schwank *Gas* Infra-Red Heaters (600 in the entire plant)** meet this tough requirement with a BTU capacity 46% less than any other proposed heating system. Total maintenance requirements consist of air blowing the gas-fired units once each heating season. After three full seasons of dependable gas heat and employee comfort, not one of the 2,400 ceramic



Approved by A.G.A., Underwriters, C.G.A. and C.S.A.

...without partitions or walls to adjoining plant areas. These gas-fired heaters are part of the 600 installed at J & L's Aliquippa Works.

...Perfection Schwank Gas Infra-Red Heaters

burners (4 per heater) has needed replacement.

Perfection Schwank *Gas* Infra-Red Heaters give J & L all the advantages of modern *gas* heat . . . high efficiency, precise control, speed, cleanliness, economy and dependability of supply. Gas can be the answer to your unusual or everyday heating problems.

Heat better for less with Perfection Schwank *Gas* Infra-Red Heaters. For complete information, contact your local Gas Company or write to Perfection Division of Hupp Corporation, licensee of American Infra-Red Radiant Co., 1135 Ivanhoe Road, Cleveland 10, Ohio. *American Gas Association*

*Under Schwank U.S. Patents 2,775,294 and 2,870,830 and pending applications.

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Rugged, dependable, fully transistorized 27-megacycle portable 2-way radio, designed specifically for business and industrial uses. Small and light, weighs less than one pound. Has 11-volt mercury battery for 50 hours' operation. Factory-installed plug-in module available to increase transmit power.

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Citizens' Band 2-Way Radio

Short-range communications facilities for business service and personal needs. Ideally suited for use on materials handling vehicles, or for 2-way conversation between fixed points. Also serves as excellent base station for hand-held radio. 6 or 12 V DC or 115 V AC operation.

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A complete line of quality Intercoms—wired, or wireless—designed for office, factory or home use, at lowest prices. Suitable for many applications, from simple wireless 2-way talk-listen systems to flexible, multi-unit systems with a variety of talk-listen-monitor options.

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CATALOG NEWS

For more data, circle item numbers on Reader Service Card next to back cover.

MATERIAL HANDLING

1—Traveling cranes. This 20-pager (15005-1B-61) contains data on Shaw-Box line of Series D overhead electric cranes. Capacities, 3 to 25 tons; spans to 80 ft. Illustrates mechanical, other features. *Manning, Maxwell & Moore, Inc.*

2—Liquid loader. Catalog LL (28 pages) describes seven basic types of loaders, and tells which types to use and where. Shows swivel joints, loading valves, spring balance for liquid loaders, other fittings. Photos. *OPW-Jordan Corp.*

3—Material handling equipment. Bolted structural steel rack installations and various types of trucks are described in two illustrated catalogs. Discusses principle of fully adjustable rack, other features. *Burtman Iron Works, Inc.*

4—Steel band conveyors. This 16-pager, "Pictures of Conveyors in Action," tells about bulk conveying and describes flat, troughed, longitudinally jointed, and perforated steel belt conveyors. Application photos. *Sandvik Steel, Inc.*

5—Conveyors. Catalog 567 discusses powered flexible conveyors for loading bags and packages into box cars and trucks. Includes data (with photos) on telescoping conveyors, multi-purpose systems, carloading stackers, mechanical palletizers. *Power-Curve Conveyor Co.*

6—Wire rope conveyors. Advantages and special features of these conveyors, basic types of head sections, wire rope supports, and other equipment are presented in Bulletin 173 (24 pages). Photos, diagrams, charts. *Hewitt-Robins.*

7—Material handling equipment. Here's a comprehensive 66-page catalog of company's entire line of equipment. Describes and illustrates trucks, dollies, drum lifters, swivel hoists, hooks, parts bins, etc. *The Vince Basnik Co.*

8—Vibrating conveyors. This 8-pager (No. 361) covers new natural frequency conveyors. Variable-stroke positive drive provides conveying speeds from zero to maximum. Photo shows dynamic balancing feature. *Stephens-Adamson Mfg. Co.*

9—Tying machines. Manual and parts catalog (18 pages) tells what machines can do and gives instructions on how to operate them. Explains how to avoid problems, how to perform maintenance operations. Diagrams. *B. H. Bunn Co.*

AUXILIARY

10—Heating, ventilating units. This comprehensive 32-pager contains engineering data for large heating units, ventilating units, heat diffusers. Selection charts for steam and hot water coil capacities. *Carrier Air Conditioning Co.*

11—Vertical unit boilers. Catalog VU-60 (6 pages) describes modular-design boiler for capacities to 250,000 lb. per hour. Self-cased, the boiler is an all-welded gas-tight envelope of finned tubes. *Combustion Engineering, Inc.*

12—Process and other equipment. Here's a 16-page Buyer's Guide (No. 1010) which covers products for handling or processing liquids and gases. Tables give specifications and process characteristics of all equipment. *The Pfaudler Co.*

13—Pumps. Bulletin 301 (8 pages) discusses centrifugal pumps designed specifically for handling most corrosive solutions. Diagram shows long-life and minimum-maintenance features. Performance curves. *Industrial Filter & Pump Mfg. Co.*

14—Fans. Construction details, drive arrangements, and other data are given in 44-pager (A1203). Capacity tables for HS fans in 12 sizes, single-inlet single-width; and 12 sizes, double-inlet double-width. *American-Standard.*

Turn the page

Inland
4-WAY®
Safety Plate
is fire-safe
AVAILABLE FOR IMMEDIATE DELIVERY
FROM YOUR LOCAL STEEL SERVICE CENTER
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"Our 70,000 pound Draw Bench was designed to operate at a maximum of 80 feet per minute, full load. We decided to increase the drawing speed on lighter tubing to 100 and 104 feet per minute. This overloaded the Speed Reducer, however, causing it to overheat. We tried four different makes of oils without success before trying LUBRIPLATE A.P.G. 90. With LUBRIPLATE, we are able to pull heavier tubing than before at 104 feet per minute without the Reducer overheating."

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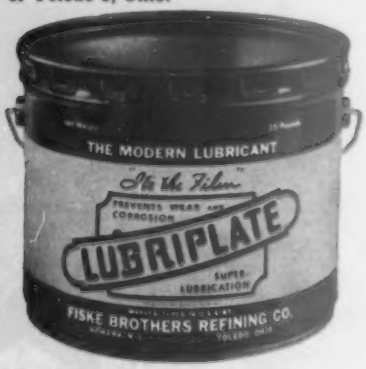
Maintenance Engineer

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.



Begins on page 216

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

15—Wound rotor motors. Bulletin 104 (4 pages) discusses new wound rotor motors ranging from 1 to 30 hp. for applications that include elevators, cranes, and hoists. Lists construction features, dimensions. *The Louis Allis Co.*

16—Air units. Six basic types of direct gas-fired make-up air units in more than 40 models are described in 16-page catalog. Also shows nine models of burner sections and air-systems accessories. *Metals Engineering & Mfg. Co., Inc.*

17—Pumps. This 16-pager, "Pump Fundamentals," gives an elementary outline of characteristics, operation, and selection of reciprocating, rotary, and centrifugal pumps. Applications. *Goulds Pumps, Inc.*

MAINTENANCE

18—Dust control. Bulletin 922A (20 pages) discusses a number of methods for controlling industrial dust and fumes. Lists essentials of a typical dust control system. Photos and drawings show collectors, other equipment. *Pangborn Corp.*

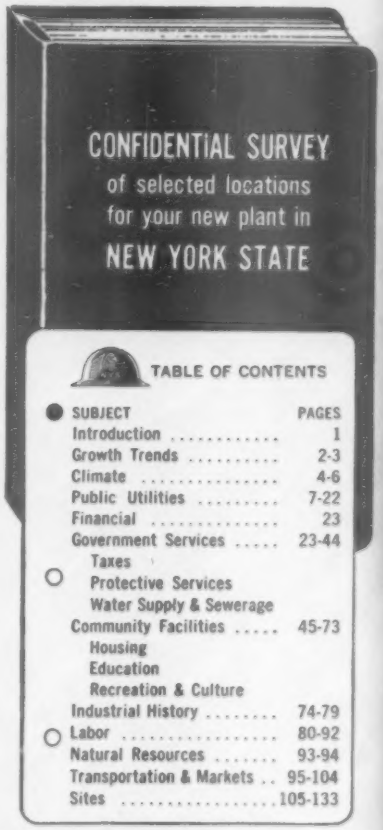
19—Spray booths, equipment. This 36-page catalog (SB-1) describes spray painting booths and related equipment, such as air exhaust fans, chambers, systems, infra-red ovens, mixing and circulating tanks, pumps, standpipes. *Binks Mfg. Co.*

20—Steel shelving. Assembly features, component parts, and advantages of company's three basic types of shelving are given in 36-page catalog (No. 2791). Data on space-saving, inventory-taking. *Columbia-Hallowell Div., SPS.*

21—Flooded plate scrubber. Catalog No. 170 (4 pages) tells about scrubber for collection of fumes, mists, vapors, and other matter from exhaust gases and process equipment. *John Wood Co.*

Turn the page

FREE TO COMPANY OFFICIALS LOOKING FOR A NEW PLANT SITE



TAILOR-MADE REPORTS. The table of contents shown above is typical of the survey of selected plant locations that we will prepare for your organization. Simply send your specific requirements on your business letterhead to Commissioner Keith S. McHugh, New York State Department of Commerce, Room 4407, 112 State Street, Albany 7, N. Y.

Keith S McHugh

Keith S. McHugh, Commissioner
New York State Department of Commerce

A sparkling glass-and-aluminum eyeful, New York's new Equitable Life Assurance Society building embodies the best in design and construction. Example: For a sure weatherproof seal, metal to metal joints, measuring thousands of lineal feet, are sealed with Tremco Lasto-Meric.* Made by The Tremco Manufacturing Company, Cleveland and Toronto, Lasto-Meric is a polysulphide elastomer sealant containing Alcoa® Aluminum Pigments.

Tremco reports that Lasto-Meric is nonshrinking and elastic, stays airtight and waterproof regardless of any ordinary pressure, movement, stress or strain. Alcoa Pigments provide a tough metallic shield of aluminum which helps protect the compound from moisture, air and sunlight . . . keep the compound resilient . . . prevent drying out and cracking.

Compounds like Lasto-Meric last longer and protect better than any other material . . . offer remarkable color match to stainless steel and aluminum surfaces. Next time you calk or glaze, tell your contractor you want a compound containing Alcoa Pigments.

Alcoa does not make glazing or calking compounds, but we will be happy to refer you to reputable manufacturers who do. For more information, send the coupon.

*Registered trademark of Tremco Manufacturing Company.

ALCOA ALUMINUM

PIGMENTS, PASTES & POWDERS

Entertainment at its Best . . . ALCOA PREMIERE with Fred Astaire as Host . . . Tuesday Evenings, ABC-TV

Aluminum Company of America
1750-K Alcoa Building, Pittsburgh 19, Pa.

Please send more information about glazing and calking compounds using Alcoa Aluminum Pigments.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

Designed by *EXPERIENCE*... Proven by *SERVICE*

Fairbanks *Micro-Control* Valves

150 lb. Bronze Globe Type

Fairbanks MICRO-CONTROL Bronze Globe Valves give you Needle Valve control and the durability of stainless steel. Here are the outstanding features of these Fig. 0525 Valves:

★**Stainless Steel Plug Disc and Seat**
Hardened to 500 Brinell, these parts resist corrosion, wire-drawing and abrasion due to solids in the fluid stream. The plug discs and seats are precision ground in *matched sets* to insure a perfect seal. These parts may be reground for long life.

★**Two Piece Union Bonnet**
Permits ready access to valve disc and seat for regrinding or replacement without removing the valve from the line.

★**Radial Seat**
The radial seat of the Union Bonnet, a Fairbanks feature, assures a tight body-bonnet joint and rigid alignment of all parts.

Fig. 0525 Bronze Globe Valve 150 lb. steam working pressure. Also available for 200 lb. and 300 lb. pressures.

Fairbanks 0525 Bronze Globe Valves are a dependable combination of precision working parts and solidly built body... designed especially for close regulation of flow.

THE **Fairbanks** COMPANY

393 LAFAYETTE STREET • NEW YORK 3, N. Y.

Branches:
New York 3 • Pittsburgh 22 • Boston 10 • Rome, Ga.

TRUCKS · VALVES · DART & PIC UNIONS · CASTERS

Begins on page 216

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

22—Gas-fired equipment. Brochure, "The Control of Draft in Gas-Fired Equipment," has 32 pages of information on the most common draft-related problems. These include draft shortages, excesses, etc. *Conco Engineering Works, Inc.*

23—Casters, wheels. Construction, selection factors, mounting arrangements, materials, other details are set forth in 48-pager (150). Illustrates hundreds of casters and wheels for many applications. *Hamilton Caster & Mfg. Co.*

ELECTRICAL

24—Capacitors. Bulletin GEA-7198 (4 pages) gives information on features, applications, ratings of low-voltage power capacitors for use on most power distribution systems. *General Electric Co.*

25—Armored cable. Fittings and accessories for interlocked cable are listed in Bulletin F11-135 (4 pages). Describes new vapor-proof fittings for continuous sheathed cable. *The Thomas & Betts Co.*

26—Circuit breakers. Low-voltage power switchgear, 15 through 4000 amp., is discussed in Catalog FB-1-6010 (16 pages). Data on increased interrupting capacity, increased frame sizes, and ratings. *Federal Pacific Electric Co.*

27—Magnetic drives. Bulletin 3650 (6 pages) describes basic components of adjustable speed drives, theory of operation, design features. Controls come in standard electronic or optional transistorized models. *The Louis Allis Co.*

28—Emergency lighting systems. This 24-page catalog (No. 252) covers two new 32-volt systems that come on instantly and automatically when normal lighting fails. Built-in circuits "report" trouble. *The Standard Electric Time Co.*

Turn the page

YOU'RE LIGHT YEARS AHEAD
WITH WESTINGHOUSE
LIFEGUARD® MERCURY LAMPS—Improved design now gives 70% longer service life (12,000 hours) and delivers more light (up to 25% more) throughout life. Special "Weather Duty" outer bulb resists thermal shock and corrosive industrial fumes.
NEW HIGH EFFICIENCY FLUORESCENT LAMPS—Just snap them into your regular preheat-rapid start and slimline fixtures. Give up to ⅓ more light at no extra cost. A different kind of light, too—soft, green-white that is comfortable and easy to work under.
BRIGHTEST FLUORESCENT LAMPS—Super Hi Output (1500 ma.) lamps provide high levels of light with fewer fixtures. Westinghouse designed lamps maintain highest light output throughout long life. Smooth, lighter weight tube is easier to clean and costs less than heavier, less efficient types.

CUT LIGHTING COSTS WITH WESTINGHOUSE LAMPS

The lamps shown above are just three of more than 8000 Westinghouse lamp types designed to give the most efficient lighting. To realize the lowest possible lighting costs, take advantage of the Westinghouse Lighting Cost Reduction Plan. It can help you save in one or more of these ways:

1. **Reduce your cost of lamp purchases**
2. **Reduce your lamp replacement labor costs**
3. **Increase your lighting level for the same or lower power costs**
4. **Give you more efficient use of power**

Your Westinghouse representative will be glad to show you how to apply the Lighting Cost Reduction Plan to your installation. For full information, contact your authorized Westinghouse Lamp Agent, or your Westinghouse Lamp Division Sales Office.

You can be sure . . . if it's **Westinghouse**

Westinghouse Lamp Division, Westinghouse Electric Corporation, Bloomfield, N.J.

For more facts Circle 531 on Reader Service Card

NOW... NARROW AISLE STACKING AND ORDER PICKING

WITH THE L-S® REMOTE CONTROL

MN AISLEMASTER®

Here's the dual purpose truck with real versatility! With its remote control platform removed, this AisleMaster can be used for normal right angle stacking in narrow aisles. Loads on pallets can be easily handled in aisles 6 feet wide or less.

Then with the order picking platform in place, operator can ride right to his work—picking and making up orders for shipping, or even filling bins! With controls on the rider platform for all horizontal and vertical movement, operator has full control of all truck operations giving him 100% order selectivity at all rack levels.

Platform can be picked up or dropped whenever necessary, depending on whether operator is stacking unit loads on pallets or picking orders. It's really a 2-in-1 "Order Picker" truck.

With a fork and platform elevation up to 156" and a load capacity of 4000 lbs., this new Remote Control AisleMaster is L-S quality built throughout. It has heavy-duty 24 volt electric system, high pressure hydraulics, all welded chassis, rugged elevating assembly and lubricated-for-life bearing design.

For complete data send for Circulars SA-44-2 and SA-44-3 and "Trucks in Action" Bulletins showing other installations of this versatile truck at work.

LS LEWIS-SHEPARD®

609 Walnut Street • Watertown 72, Mass.

The MASTER® Line — The COMPLETE Line of Materials Handling Equipment

Begins on page 216

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

29—Power fuses. Application Data booklet (36-660, 16 pages) is a useful guide for selecting power fuse best suited to various applications, such as transformer and motor protection. Describes three types. *Westinghouse Electric Corp.*

30—Battery chargers. Details of company's expanded line of lead-acid chargers are given in Bulletin 6202.1 (4 pages). Two new models charge 6- to 20-cell batteries. *The Lincoln Electric Co.*

31—Indoor, outdoor lamps. Here's a 16-page catalog (107) that tells about 116 different types of hard glass incandescent and mercury reflector lamps. Candlepower curves show various light distribution patterns. *Radiant Lamp Corp.*

32—Gasoline electric set. This 6-pager (BU-752) presents company's G-226 engine that powers the 20- to 35-kw. set, and its a-c brushless generator. Specifications. *Allis-Chalmers Mfg. Co.*

BUILDING

33—Steel panels, framing sections. Two catalogs: New 2½x½-in. corrugated galvanized steel panels, widths to 45 in., five colors, are subject of 4-pager. High tensile steel framing sections are covered in 6-pager. *The Binkley Co.*

34—Structural materials. This 60-page Design Manual (spiral bound) presents comprehensive story of material that is extremely adaptable, flexible to design needs, with high strength-to-weight ratio. *International Steel Co.*

35—Acoustic panels. Bulletin C70 describes fire-resistant panels for use as sound barriers and partial enclosures to control noise. Come in cold-rolled, galvanized, stainless steels, other materials. *Industrial Acoustics Co., Inc.*

Turn the page

SUCCESS STORY

of a revolutionary air conditioning system!

CARRIER ROTASPRAY units require less than ⅛ the space of a conventional system of the same capacity—may be ceiling hung, wall cantilevered or mounted on the roof.

Six years ago Carrier pioneered an entirely new concept in air conditioning for industrial applications—the Rotaspray Weathermaker* System. It is now in operation in such widely different fields as textiles, plastics, rubber, candy, steel, cigar, paper, leather and garment. What is its record of performance? The best indication is the many repeat orders we've had . . . and are getting . . . from satisfied users. Can you use the Rotaspray System to advantage? Here are some of many reasons why it may be the best answer to new construction or reconversion problems.

UNITARY DESIGN. Instead of complete central station systems which require larger apparatus rooms, Rotaspray units are spotted conveniently throughout a plant. Only one central water handling apparatus is required.

FLEXIBLE INSTALLATION. Because of the compactness and low operating weight of Rotaspray units, they can be installed either ceiling hung, wall cantilevered or roof top mounted.

LOW MAINTENANCE. Rotaspray units incorporate self-cleaning "Cant-Clog" nozzles and a self-cleaning eliminator. Compared with large central station systems, they reduce cleaning and maintenance costs as much as 80%.

LONG LIFE. Rotaspray units are fabricated of stainless steel and other durable materials to assure years of virtually trouble-free operation.

HIGH EFFICIENCY AIR CLEANING. Each Rotaspray unit separates dust and other particles from the air . . . assures a "scrubbed clean" air supply at all times.

BETTER TEMPERATURE AND HUMIDITY CONTROL. By a new control method especially designed for the system, the old method of dew point control has been eliminated. Zoning control has also been eliminated. Each Rotaspray unit accurately controls temperature and humidity in its own area.

For complete information, write Carrier Air Conditioning Company, Syracuse 1, New York. In Canada: Carrier Air Conditioning Ltd., Toronto 14.

**Reg. U.S. Pat. Off.*

Carrier Air Conditioning Company

ADFINISH
BY SWIFT

SPARK-UP NEW OR OLD MASONRY—INSIDE OR OUT

Brush or spray Adfinish on to any masonry surface, and you will beautify the surface while you protect it. Adfinish goes on easily over dry, damp or previously painted surfaces. Use it to:

Finish or refinish concrete
Finish damp masonry
Spark-up brick, block, stucco
Impart moisture resistance

Not a paint or plaster, Adfinish is a new adhesive finishing concept. It's easy-to-use, fire retardant; chemical, moisture and vermin resistant. Comes in three attractive colors.

Return the coupon for details on Adfinish.

Swift
ADHESIVES

106TH YEAR

JUST CLIP TO LETTERHEAD AND MAIL

AD-12

Swift & Company
Adhesive Products Department
115 W. Jackson Blvd.
Chicago 4, Illinois

☐ Send bulletins on ADFINISH

☐ Send information on trial order

Name_____

Begins on page 216

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

36—Partitions. Here's an 8-page catalog with information on new 2⅜- and 3-in. movable partitions. Elevation and detail drawings show different heights. Photos and specifications. *Rockaway Metal Products Corp.*

37—Fire doors, exit hardware. This 1961 edition of 8-page booklet reviews company's fire protection products. Illustrates 90 door styles; tells about application of new fire-exit hardware; gives selection data. *Overly Mfg. Co.*

INSTRUMENTS AND CONTROLS

38—Humidity instrumentation. This 8-pager (SF1) lists hygrometer system components that detect, measure, record, and control relative humidity. Explains narrow- and wide-range sensing elements, other features. *Hygrodynamics, Inc.*

39—Pressure gauges. Bulletin 280 (4 pages) describes two 3-in. and three 5-in. dial models with new multi-wound helical coil element for direct reading. Specifications, dimensions, figure intervals, etc. *American-Standard Controls Div.*

40—Data acquisition system. Low-cost equipment for data acquisition is discussed in 6-pager. Tells how costs are reduced with fast and accurate transmission of data to computer—no need for key punching. Photos. *Datex Corp.*

41—Recording wave analyzer. Here is a 4-pager that tells about company's Model 800 analyzer for measuring the amplitude of all the frequency components in any waveform. Records them on a built-in strip chart recorder. *Optron Corp.*

42—Heating furnace controls. This 24-page catalog (Folio 122) presents data on automatic control for open

CUT COSTS with MAGNETIC CONTROL

The fastest and easiest scheduling board-CONTROLS machine loading, production, maintenance, personnel, sales, dispatching, organization charts, projects, and others. Steel board holds permanent various colored magnets, magnetic card holders for colored cards, arrows and other colorful accessories. MAGNETS MOVE FASTEST OF ALL. Let us place our eight years of experience in this field at your service.

Write for Free Brochure (F-10)

METHODS RESEARCH CORP.
105P WILLOW AVE., STATEN ISLAND 5, N. Y.
Circle 535 on Reader Service Card

SOURCES OF SUPPLY

Suppliers and sub-contractors in the Northern Plains can be pinpointed quickly by the Facilities Register, a unique electronic index of production facilities. Whether yours is a problem of finding new suppliers, contracting for idle machine time, shortening lines of supply, or obtaining better quality and service:

ASK THE MAN FROM THE NORTHERN PLAINS

NORTHERN NATURAL GAS COMPANY
SERVING THE NORTHERN PLAINS ☐ GENERAL OFFICES: OMAHA, NEBRASKA

Circle 536 on Reader Service Card

Circle 534 on Reader Service Card

FOR SAFETY YOU CAN SEE REMEMBER THE "V" FOR VISIBLE BLADES!

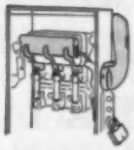
• The men who pull the switches will tell you what can happen when a switch, *believed* to be open —*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

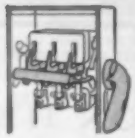
They cost no more... why settle for less?

Square D Company, Mercer Road, Lexington, Kentucky

Extra Safety with Square D's Handle Design



WHEN IT'S UP IT'S ON!



WHEN IT'S DOWN IT'S OFF!

Handle is integral part of switch, not cover. When door is opened, handle remains attached to switch. Eliminates hazard of false handle indication or defeat of padlock provision. When it's padlocked, it's locked!

SQUARE D COMPANY

wherever electricity is distributed and controlled

Begins on page 216

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card.

hearth furnaces, glass tanks, reheating and annealing furnaces, soaking pits. Covers sub-systems. *GPE Controls, Inc.*

43—Surfindicator. Catalog PG-20 (6 pages) contains information about two models of this portable instrument for measuring surface microfinish on metal, plastic, glass, or other materials. Weighs less than 6 lb. *Brush Instruments.*

PRODUCTION

44—Innershield welding. Bulletin 5300.1 (12 pages) discusses vapor-shielded arc welding. Lists construction details and mechanical features of welding equipment. Illustrates typical process applications. *The Lincoln Electric Co.*

45—Power tools. Revised catalog (AB-61, 96 pages) presents complete line of tools and accessories. New items include 17- and 20-in. power feed drill presses, 12-in. cut-off machine, and 7-in. standard grinder. *Rockwell Mfg. Co.*

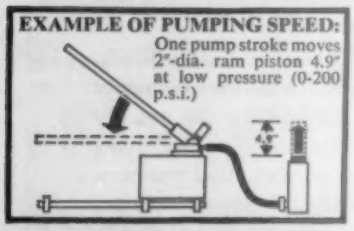
46—Weldments. This how-to book (16 pages) offers instructions and welding tips useful for repair and rebuilding of worn parts. Some applications: dipper teeth, tractor grouser bars, crusher parts, etc. *American Manganese Steel Div.*

47—Machine drives. Catalog 761 (8 pages) describes drives for fast start-stop cycling of production machinery and machine tools. Take peak loads to 10 times rated capacity. *Ferguson Machine Co.*

48—Ceramic tooling. Three bulletins: No. 61.1 tells where, when, and how to use cutting tool material Ceramic VR-97; No. 61.2 deals with ceramic machining on steels; No. 61.3 covers use on cast iron. Charts, etc. *Vascoloy-Ramet Corp.*

49—Positioning controls. Control block diagram and step-by-step explanation of use of automatic

Get fast ram approach, save time with new 2-speed hydraulic pump



Pump, valving and controls mount on common cover plate; use with other reservoirs.

- **Delivers a big 7.35 cu. in. of oil per stroke at low pressure (0 to 200 p.s.i.)**
- **Delivers .294 cu. in./stroke from 200 to 10,000 p.s.i. for high force requirements**
- **For operating both single and double-acting cylinders**

Here is a compact, precision-built 10,000 p.s.i. 2-speed hand pump with the ability to deliver exceptionally high volume at low pressure for fast ram approach and return. Handle high-force requirements, yet waste no time getting the ram to the work! Choice of 2-way or 4-way control valve, mounted easily on cover plate; no exposed piping. Unit weighs only 34 lbs.

Ask your OTC distributor about the new OTC "Dual-master" pump.

PRECISION HYDRAULICS DIVISION

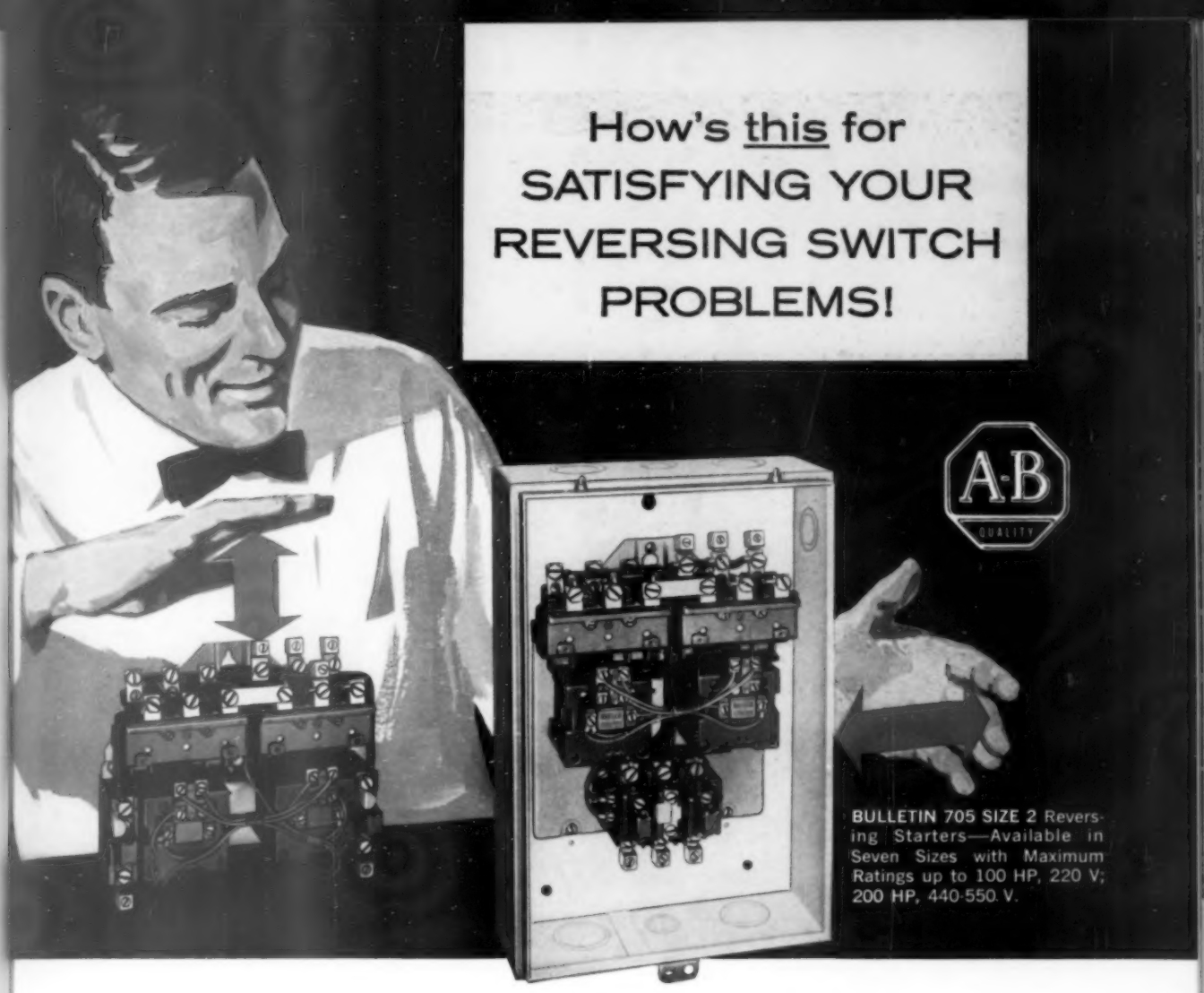
OWATONNA TOOL CO.

399 CEDAR ST., OWATONNA, MINN. CABLE: TOOLCO

RESEARCH ENGINEERING · DEVELOPMENT OTC

DESIGNERS AND MANUFACTURERS OF QUALITY HIGH PRESSURE HYDRAULIC COMPONENTS

How's this for SATISFYING YOUR REVERSING SWITCH PROBLEMS!



BULLETIN 705 SIZE 2 Reversing Starters—Available in Seven Sizes with Maximum Ratings up to 100 HP, 220 V; 200 HP, 440-550 V.

Open or Enclosed—THEY SAVE SPACE WHERE IT COUNTS MOST

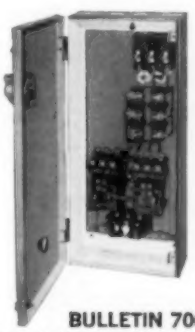
Listen to this—*all new "open type" A-B reversing switches* have the overload relays mounted at the sides as shown—ideal construction for panel channel wiring. It fits with A-B contactors and starters of the same rating. The over-all width for each rating is also appreciably less than it was with the old Bulletin 705.

All new enclosed A-B reversing switches have the overload relays (either 2 or 3) mounted as a "block" below the reversing switch. This permits a narrow enclosure—ideal for most mountings on machine tools.

Rating for rating, the new Allen-Bradley reversing starters will set new records for long, trouble-free life. The new structure is so simple and so sturdy that nothing can go wrong. If you have a particularly tough service application, try the new A-B Series K reversing switches—and live happily ever after.

You'll like the new line of modern, attractive enclosures, too. Brooks Stevens, internationally known industrial designer, has given them that extra "eye appeal"—which is an asset for every installation.

For complete information on these new reversing switches, please write today for Publication 6100, Allen-Bradley Co., 1316 S. Second Street, Milwaukee 4, Wisconsin.



BULLETIN 706 Size 1 Combination Reversing Starter—available with fused or unfused manual disconnect switch, or as Bulletin 707 with circuit breaker.

17-G1-HR

ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

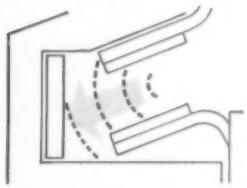
The Superior "Quality" of the New Allen-Bradley Starters GREW OUT OF DESTRUCTIVE TESTS

Tests which subject starters to far more severe conditions than heavy-duty service are "routine" at Allen-Bradley and provide data for improved starter design

There was no question about the "quality" of the old Bulletin 709 starters but—the new line is far superior. With their built-in "extra" interrupting capacity, each rating of the revolutionary new Allen-Bradley motor starters can operate with ease at maximum rated capacity for prolonged periods—and still have more than ample reserve for emergency conditions. The new, totally enclosed arc hoods are hot molded of a material having unusual arc quenching properties. In addition, powerful arc blowouts and wrap-around metal quenchers assure fast, efficient arc extinction and heat dissipation. There are many other features about this new line that you ought to know. Therefore, please write for Bulletin 6100, today! Allen-Bradley Co., 1316 South Second Street, Milwaukee 4, Wisconsin.

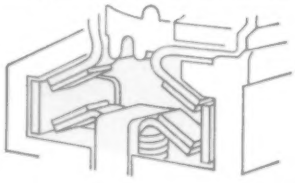
Here's How EXTRA Interrupting Capacity Is Built Into All Allen-Bradley Starters

Powerful Arc Blowout



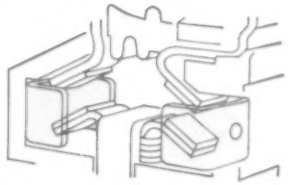
The powerful magnetic field, generated between the contacts when an arc is drawn, forces the arc off the end of the contacts. It is quickly cooled and extinguished by the large surfaces of the hood.

Totally Enclosed Chambers



A new, unusually strong and stable material is hot molded to extremely close tolerances. Each chamber of the arc hood is totally enclosed. Thus, the usual effects of ionization and heat are greatly minimized.

Metal Arc Quenchers



Size 2 starters and the higher ratings have metal quenchers in both the front and back of each arc chamber. This efficient construction gives the arc no chance to become destructive.

17-61-MR

ALLEN-BRADLEY

QUALITY
MOTOR CONTROL

EXIDE POWER PACKAGE

Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa. (ESB)

HOW MUCH EXTRA BATTERY LIFE CAN YOU GET?

You may be getting good battery life now. But the fact is that almost every battery can give better life if certain rather simple conditions are met.

Helping you to get maximum life, and therefore greatest economy, from your batteries is part of the Exide Power Package. The first step is selecting the particular type and capacity battery to fit the job. Your Exide man will recommend a battery capable of providing adequate power without the need for deep discharging. Knowing how to do this accurately is part of his special skill.

The Exide Power Package: Broadest choice of all types of batteries and chargers to meet all requirements, plus factory-quality service for both batteries and chargers.

To meet your particular requirements, he can draw from the broadest line of batteries for industrial truck power, including Exide-Ironclad with tubular positive plate construction; Exide-Powerclad premium pasted plate; and the improved Exide nickel-iron-alkaline (invented by Thomas A. Edison).

Second, it is important that the charger be able to recharge the battery completely within the allotted time, and at the desired rate. If a battery isn't adequately charged, it loses efficiency and its power output is reduced. At the same time, you must guard against overcharging too. Play safe. Ask your Exide man to recommend the right size and type Exide charger when you buy your Exide battery.

Third, make sure your batteries receive good upkeep. This involves more than just routine cleaning and watering. It means periodic inspection and checking by battery maintenance engineers. Exide service men will help you set up good battery maintenance schedules. They will diagnose problems which might develop—show you whether the cause is in the truck, the charger, the application, or the maintenance. And they will take care of any repairs or adjustments to batteries or chargers which might be called for. You get complete battery and charger service from one source, fast, thorough, dependable.

The combined effects of these three basic parts of the Exide Power Package mean not only longer battery life, but greater battery economy year after year. Find out exactly how you can benefit. Write Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

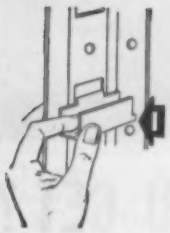
Simplified electricity bulletin. Do you want to know how storage batteries work and what goes on as they charge and discharge? Send for this detailed bulletin. It's yours free. Also contains tips on how to keep batteries in top operating condition.

Exide®

For more facts Circle 540 on Reader Service Card

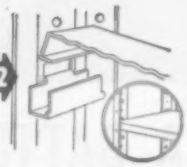
BORROUGHS STEEL SHELVING is your answer for efficient, economical shelving

this feature alone should swing you to Borroughs!



Insert 4 shelf support brackets with finger-tip ease — no fumbling with studs, bolts, nuts or lock washers.

Tilt shelf into support brackets with the greatest of ease—shelf is ready for loading.



THERE'S no question about it — Borroughs Steel Shelving will answer practically any shelving demand, whether for strength, adjustability, or adaptability to storage areas or materials to be stored. The following Borroughs features are well known to the industry, but they are well worth repeating . . . Borroughs provides one of the widest selections of heights, widths and depths available anywhere . . . Borroughs posts are specially formed for the greatest strength possible . . . Borroughs Shelving can be assembled, easily and quickly, without any special tools . . . shelves are readily adjustable without nuts or bolts . . . each shelving unit is absolutely complete in itself.

send for catalog

Represented in Sweet's Catalog, Plant Engineering File 4G BO

BORROUGHS MANUFACTURING COMPANY
OF KALAMAZOO
A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT
3020 NORTH BURDICK ST. amp KALAMAZOO, MICHIGAN

Begins on page 216

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card

numerical positioning controls for machine tools are contained in M104 (12-pager). M103-A (4 pager) gives case study. *Rheem Mfg. Co.*

50—Machine tools. Bulletin MT4 (20 pages) covers company's line of tools, including milling, grinding, automatic and hand screw, and turret drilling machines; accessories. *Brown & Sharpe Mfg. Co.*

51—Wet blasting. This 24-page handbook (No. 105) shows how and where savings can be made in precision finishing by use of Liquamatic wet blasting. Also tells how hand finishes can be achieved mechanically. *Wheelabrator Corp.*

VALVES AND PIPE FITTINGS

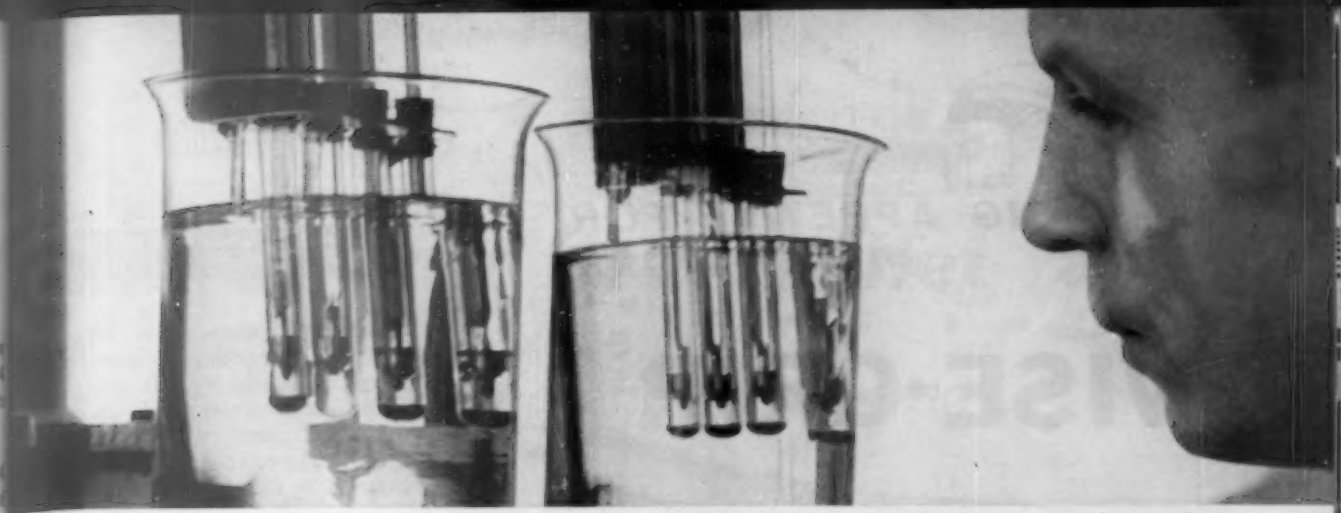
52—Pipe fittings. Catalog 3PF (12 pages) describes ductile iron fittings and lists ASTM, ASM, and MIL specifications met by these fittings. Covers couplings, flanges, hexagon bushings, plugs. Data on ratings. *The Kuhns Bros. Co.*

53—Valves. Comprehensive manual (64 pages) contains information on pneumatic diaphragm and piston actuators, as well as wide variety of valve body assemblies. Details on selection of proper control valves. *Fisher Governor Co.*

54—Air control products. Air and hydraulic equipment ranging from cylinders, valves, and rotating joints to filters, regulators, quick-acting couplers, and hose fittings are included in handy-size catalog (No. 125). *A. Schrader's Son.*

55—Tube fittings. Catalog 4323 (20 pages) presents Ridg-lok tube fittings with reversible ferrule—both ends identical. Made in Type 316 stainless steel for corrosion resistance; in brass for instrumentation. *Parker-Hannifin Corp.*

Turn the page



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390°F. All greases tested except Darina (second tube from left) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease that helps it save up to 35% on grease and labor costs

Darina® Grease is made with Microgel*, the new thickening agent developed by Shell Research.

Darina lubricates effectively at temperatures 100° hotter than most conventional soap base greases can withstand.

Read how this new multi-purpose industrial grease can help solve your lubricating problems and even save you up to 35% on grease and labor costs.

THERE IS no soap in Darina Grease. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina uses Microgel—a grease component developed by Shell Research.

What Microgel does

Because of Microgel, Darina has no melting point. It won't run out of gears or bearings.

Compared with most conventional soap-base greases, Darina provides significantly greater protection under adverse service conditions.

Mix water into Darina and the grease does not soften. It shrugs off water—won't emulsify.

Resists heat

Darina will withstand operating temperatures 100° hotter than most conventional multi-purpose greases. It cuts leakage and reduces the need for special high-temperature greases.

Also, Darina resists slumping, thus forming a more effective seal against foreign matter.

Saves money

Shell Darina can reduce maintenance expenses while it protects your machinery. Savings of up to 35% on grease and labor are quite possible.

In some cases lubrication intervals have been extended to double what they were before. Less grease is consumed and less time consumed applying it.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

*Registered Trademark

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are helping to provide better products for industry

For more facts Circle 542 on Reader Service Card

5 *Useful Tools in* **1**

VISE-GRIP—a tool shop you can carry in your pocket! It's a wrench, super-pliers, clamp, hand vise, wire cutter *all in one*. Locks onto work with non-slip TON-grip, releases with fingertip pressure. Most used maintenance tool in industry. See your supplier.

PETERSEN MANUFACTURING COMPANY • DEPT. F-10 • DEWITT, NEBRASKA
For more facts Circle 543 on Reader Service Card

COULD THIS HAPPEN IN YOUR PLANT?

VALDURA EPO-SURFACER

eliminates dangerous concrete cracks!

Pits and cracks in concrete floors that can cause serious bodily injury from falls and costly damage to machine parts *can be eliminated* with Valdura's Epo-Surfacer. This 100% solids Epoxy product provides a "slip-proof" coating for floors, stairs, ramps, tank cars. A thin film — only 1/8" thick — can be applied, cured, and be ready for use overnight.

Mail coupon for a FREE trial in most troubled area in *your* plant.

FREE

Contact me about patching an area in our plant with Epo-Surfacer — at no charge to us.

VALDURA Heavy-Duty PAINT DIVISION
AMERICAN-MARIETTA CO., CHICAGO 11, ILLINOIS

NAME.....
COMPANY.....
ADDRESS.....
CITY..... STATE.....

Begins on page 216

CATALOG NEWS

For more data, circle item numbers you want on Reader Service Card

56—Rotary valves. This 4-pager (N-261) describes precision-built valves for feeding dry bulk materials or for use as an air seal. Gives construction features of Types A and B valves, specifications, dimension charts. *The Day Co.*

MECHANICAL

57—Thermocouples. This 8-pager (TB-160) gives facts on seven models. All feature response time less than 10 micro-seconds to transient flow; continuous service temperatures of over 2000 F.; velocities over 6000 fps. *Nanmac Corp.*

58—Hydraulic checking unit. Principles of operation, engineering features, dimensional and application details are given in 14-page catalog. Units come in various sizes and operating ranges. Photos. *Pokorny Pow-R-Trol Products, Inc.*

59—Power transmission device. Here's a 4-pager that tells about triple-purpose device. It's for electric or gasoline drives, combines automatic clutch, starting and acceleration control and torque selector. *Olme Precision, Inc.*

60—Pumps. Series K rotary pumps are discussed in 8-page catalog (F-4176). Adaptable to wide range of jobs such as pressure lubrication, hydraulic service, fuel supply. *Roper Hydraulics, Inc.*

61—Drives, couplings. Two catalogs: No. 70 (20 pages) explains simplified method for selecting dry fluid drives and couplings for many uses. No. 901B (24 pages) covers expanded line of flexible cushion couplings. *Dodge Mfg. Corp.*

62—Blowers. Bulletin S-32-A (12 pages) describes blowers' one-piece shaft, anti-friction bearings, timing gears and hubs, forced feed lubrication systems. Diagrams and charts show dimensions, performance, and other details. *Sutorbilt Corp.*

FLEXIBILITY

EMI *air-row head pallet racks*

the most flexible,
cost saving and work saving
racks in the industry.

EMI *air-row head DRIVE-IN RACKS*
EMI *air-row head DRIVE-THRU RACKS*

These strong, efficient, space-saving racks are all engineered on the AIR-ROW Head principle with basic interchangeable parts.

EQUIPMENT MFG. INC.

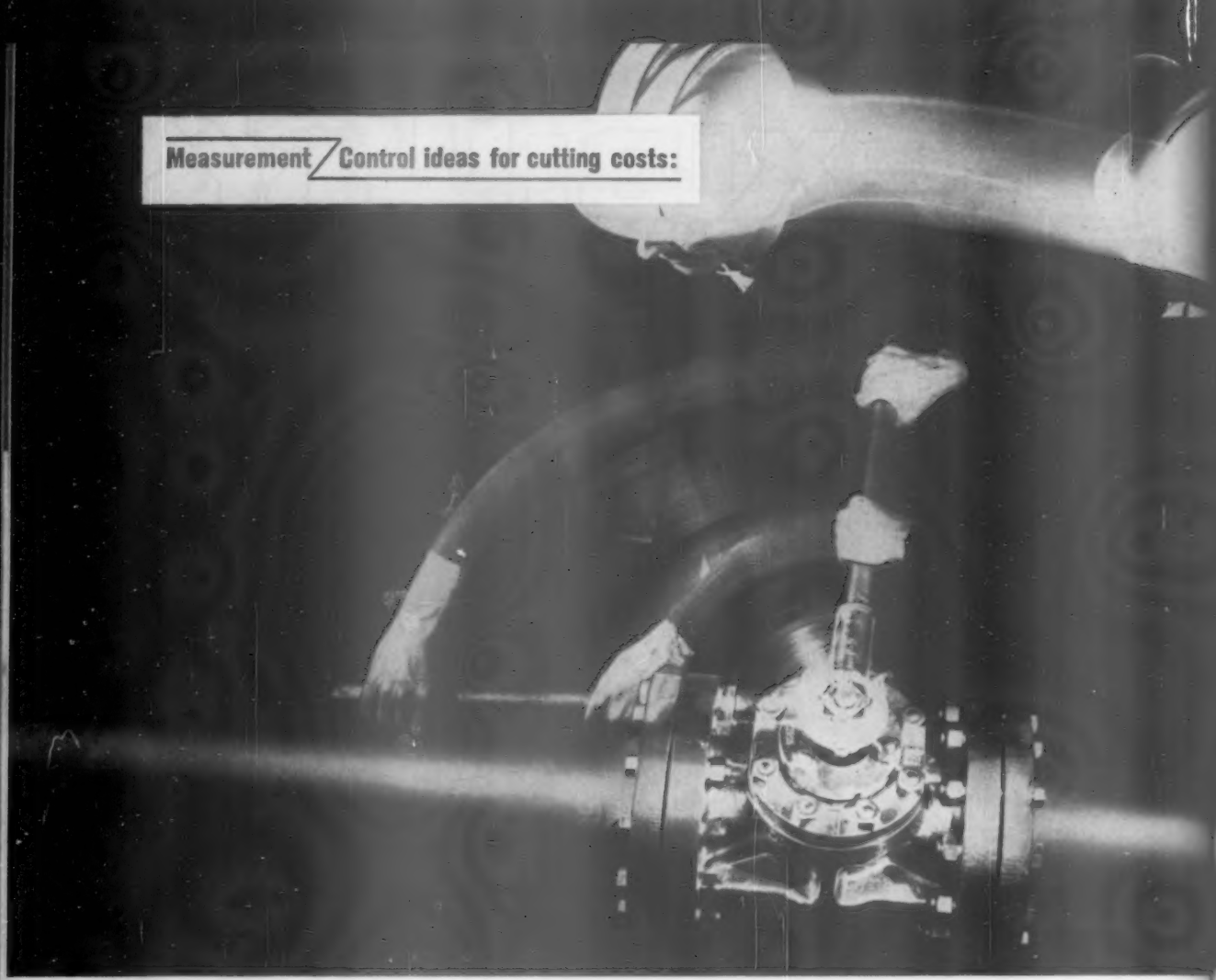
21561 HOOVER ROAD • DETROIT 5, MICHIGAN

Before you build, remodel or add to a storage area, FIND OUT ABOUT AIR-ROW HEAD RACKS

WRITE FOR DETAILED INFORMATION

YOU CAN STACK ANYTHING ON **EMI** RACKS

For more facts Circle 545 on Reader Service Card



SAVE MONEY ON TOUGH SERVICES WITH QUARTER-TURN LUBRICATED PLUG VALVES

You'll get a big bonus of longer life and bottle-tight shut-off with Rockwell-Nordstrom lubricated plug valves. Fully protected seats and dependable operation assured by lubrication mean superior performance on difficult services—pickling acids, caustics, slurries, etc. On other and easier services, you will also benefit, since Rockwell-Nordstrom valves cost no more than non-lubricated valves and in some instances less. They open or shut quickly with a quarter turn of the wrench.

There are literally hundreds of ways Rockwell measurement and control equipment is helping manufacturing and processing plants save time, money and materials. The experience of the world's largest single manufacturer of valves, meters, regulators and other equipment for measurement and control can pay off for you, too. Wherever liquids or gases flow through pipes in your plant there is a real opportunity for savings. It will cost you nothing to get the facts . . . Simply send the coupon.

ROCKWELL

The leading single source for Measurement / Control products and ideas

For more facts Circle 546 on Reader Service Card

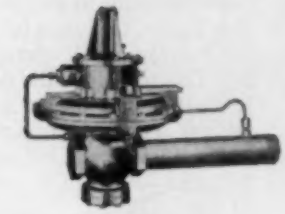
"IN-PLANT" METERING:

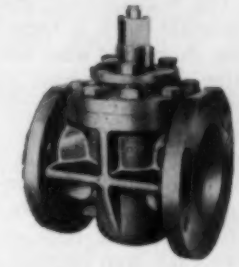
LIQUIDS AND GASES

Rockwell gas and liquid meters, properly applied, can improve quality control, sharpen cost control, and prevent waste in almost every plant department. A Rockwell Field Engineer can help you find *where* meters will cut costs . . . and Rockwell has a complete line of meters to measure practically anything that will flow through pipe.

CONTROLLING PIPED MATERIAL:

LIQUIDS AND GASES





More efficient control of all the material flowing through pipes in your plant is a positive step in cutting costs. There are new applications and new ideas for using gas pressure regulators and valves that will stop wasteful, inefficient, and dangerous handling of fuels, production fluids, and products. A Rockwell Field Engineer can show you *where* and *how*.

HOW MUCH COULD YOU SAVE?

There is hardly a plant anywhere—including yours—where the right application of the right measurement and control methods and equipment won't produce savings many times the modest cost involved. Certainly it's worth investigating—especially since it will cost you nothing to find out. Simply mail the coupon now.

SEND COUPON NOW!

MEASUREMENT AND CONTROL DEVICES

all fine products by

ROCKWELL

Rockwell Manufacturing Company, Dept. MCIK, Pittsburgh 8, Pa.

Please send me literature as checked:

- ☐ Valving gas, liquids and slurries. Bulletin V-821
- ☐ Measuring gases. Bulletin 1085
- ☐ Regulating gas pressures. Bulletins 1044, 1059, 1082, 1086
- ☐ Measuring liquids. Bulletins P-100, PI-666, OG-400
- ☐ Condensed catalog of all products. Bulletin C-5000
- ☐ Please have your Field Engineer call.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

How to start a Preventiv

OUR PM PROGRAM got the best start it could ever get—top management support. It needed it. While PM had been accepted as a concept for some 15 years—as in many other plants—it was not organized to achieve its maximum potential.

About three years ago our general manufacturing manager took action in the conviction that an organized PM program would cut production downtime and maintenance costs. First move was the appointment of a full-time director of PM to promote and build the program. He was made to report directly to the general superintendent in charge of production plants, to insure full support of the program by all operating personnel. This move had the desired effect in starting PM on the long road to success. The entire organization now realized that top management meant business—PM had to become a way of life at Buick.

Top management made another important move. It knew that no one man, no matter what his title, could swing a PM program alone. So it got every level of supervision into the act, by setting up a training course on the objectives of PM. All 1500 productive and non-productive supervisors had to take part—four sessions of one hour each. At its close each man received a two-page memorandum from the general manufacturing manager with a 24-page booklet on "Buick's Preventive Maintenance Program." (Editor's Note: Not available to readers.) The booklet summed up the objectives this way: "This is the aim of preventive maintenance at Buick—to care for each facility in such a way as to assure that it will serve throughout its expected life with the least amount of breakdowns or failures."

The training course set people to thinking about PM. It established the responsibility of production supervisors in proper care of equipment, thus helped to get their cooperation in making machines available for inspection. Through open discussion of problems in the sessions, the PM director got a better insight into plant problems that PM could solve. All supervisors learned the pattern of what was to come in working with the PM director.

A third critical move—a PM priority policy—was announced in the booklet, to forestall any slighting of PM assignments. Under a "Criteria for Urgency," supervisors were instructed as to the priority of various types of maintenance work, in this order:

1. Emergency work. Involving equipment shutdown, or affecting product quality, or remedying hazardous conditions, or jeopardizing high values.
2. Scheduled preventive work. All PM assignments.
3. Scheduled major repairs. All maintenance assignments.
4. Direct maintenance. Non-emergency repairs on operating or productive equipment.
5. Indirect maintenance. Modifications, specialty work, convenience items, testing work, minor construction, etc.
6. General property maintenance. On buildings or property.

Results of Program. After four years Buick can point to some creditable results. Not that the program is in full swing—it still has a long way to go. This is not a project that can be done quickly. Speedier application might be possible, but has not been deemed expedient in our type of operations. Yet progress, although necessarily slow, has been sure. And already evidences of success have come in, such as these:

- At least 25% of our maintenance manpower is engaged in PM. Of this, 10% handles inspections, 15% takes care of repairs and improvements therefrom.
- Performance of maintenance men is better, because we are now working on much equipment by schedule rather than when forced to by breakdown.
- Downtime caused by inadequate maintenance is significantly downward. It has recently dropped 42% in 9 months in the foundry, markedly decreased in an assembly plant. Improvement in other plants varied with degree of participation.
- Maintenance supervisors say their job has been made easier by introduction of PM schedules. They complain if new weekly schedules are delayed.
- The program is integrated with many plant operations, such as periodic calibration of instruments for better quality control. Some PM schedules, such as hoists, are primarily for safety.
- Substantial dollar savings are resulting from corrective designs emerging from PM studies. For example, an 85% cut in repair bills on two types of equipment in our foundry by a change to aerosol lubrication. A cut from 66 to 6 sets per year in bearing replacements on gear shavers by redesign of lube system. An increase of 600% in life of sludge and sump impellers by changing to a synthetic rubber coated type. And remember, such savings will keep on repeating themselves year in and year out.
- Spare parts get better control, are no longer loose or scattered. A foundry study released over $150,000 excess spare parts. Production delays are shortened because of availability of belts and sprockets, and knowing where they are.
- Application to powered mechanical handling equipment comprising some 1000 units, with emphasis on monthly programmed lubrication, has cut lubrication delinquencies from 70% to 2.7%. This has increased average age of equipment,

V. H. BYRER
Director of Preventive Maintenance
Buick Motor Division of G.M.C.
Flint, Mich.

Maintenance program

with a slight decrease in maintenance costs.

At this stage we can't conceive of being without PM. The penalties would be too heavy. Our new $3-million waste-treatment plant would break down and slow up production. Our foundry woud revert to an expensive emergency-repair basis. Our materials-handling trucks would jam the shops. PM often uncovers minor defects that, if undiscovered, would lead to downtime. For example, on a large press bearing a grease fitting hidden by angle iron was found not being serviced. There's no escaping it—it's PM or higher production costs. And as one maintenance foreman observed: "If PM were not taking care of equipment regularly throughout the year, the work that would pile up to be done during a model change would be too much to handle."

Complex Problem. We doubt that any plant can offer a wider variety of physical and operating conditions more hostile to PM than Buick. To wit, if Buick can set up a successful PM program, anyone can do it. It is hailed as the world's largest self-contained automobile plant, with 109 buildings spread over 285 acres of ground. They contain some 10,000 machine tools and 60 miles of conveyors. Operations include a forge plant; car assembly; transmission machining and assembly; axle, sheet-metal, and engine plants; grey-iron foundry; service parts manufacturing; plating; tool manufacturing; service parts packaging and shipping; and salvage and by-products plant. Each is an independent, autonomous unit, answerable only to top management.

Maintenance problems vary greatly. The foundry has abrasive dirt, heat, and line-startup difficulties. Car assembly is concerned with continuity, especially its conveyors. Machining plants are plagued with troubles in hydraulic and electrical systems and control devices. Thus the PM needs in one plant are not those of another. They cover the whole maintenance spectrum.

To confound the problem further, maintenance is handled by 15 separate and non-integrated groups. Total maintenance force runs about 1300 men—area men, machine repairmen, and maintenance men in assigned works engineering shops. The works engineer maintains all physical plant and utilities, but not production machines. They are maintained by machine repair departments each reporting to its respective factory manager.

Clear-Cut Solution. How would you start to set up a PM system for a complex situation as just described? In most plants the maintenance manager makes a complete inventory of plant and equipment, thus sets up an equipment record. He then analyzes each item for needed PM attention —lubrication, cleaning, adjustment, parts replacement. He next develops written schedules of some sort, supplemented by a tickler record, manual or mechanical. If the plant is large, he may work out this pattern progressively by department.

None of these techniques was feasible at Buick. It would have taken an army of engineers for an initial inventory survey. We would have been deluged with paperwork. Any engineering analysis of what to inspect and how often would bound to be one-sided if it did not reflect operating experience. We wanted our supervisors to realize the PM program was theirs to apply, not one to imposed in detail from the top down. This was to be a grass-roots approach.

A look at the present PM organization bears out this aim. Except for a secretary, the PM director has no one reporting to him. In a sense he works in a staff capacity, to administrate the program. He promotes PM through top supervision of each manufacturing unit. This supervision is responsible to top management for the extent of its adoption of PM techniques recommended by the PM director. To insure the communication of such techniques, each major producing plant—twelve in all—has a PM representative with whom the PM director may discuss PM problems. He may be a superintendent or a maintenance engineer. He is known as the PM coordinator, handles all maintenance problems in his area. Coordination is one of his major responsibilities. He is the point of contact when production people have any PM difficulties. For example, a PM schedule may interfere with output, or equipment need modifications, or PM services need improvement. There are no regularly scheduled meetings between PM director and coordinator. This is a day-by-day rapport. The coordinator is the voice of PM director in his area, and responsible for local promotion and execution of the program.

This organizational concept has overcome the barriers of confused and complex operating entities. Centralization of procedures in the PM director has permitted development of a uniform and effective program. It now encompasses activities in lubrication, cleaning, training of personnel, spare parts control, inspections, repairs and adjustments, redesign. At Buick, the conduct of all these facets follows accepted principles about which much has already been written. What is probably little known is our approach for simplifying the installation and administration of scheduled PM to our complex situation. So we'll confine ourselves to describing the techniques involved: (1) field survey, (2) weekly assignments, and (3) control reports. These elements are based on the use of a simple form for setting up PM tasks, for assigning them, and for keeping rein on PM performance. While we do resort to punched cards (IBM) to simplify the clerical load,

there's no reason you can't adapt the same basic principles to use of many other manual or mechanized recording systems.

FIELD SURVEY

This technique solved our problem of building a PM schedule. Its purpose: to give complete data on any type of facility on which PM is wanted—a machine tool, a conveyor, or a ventilating system. Notice we do not say "needed"—this is a voluntary matter. For this we use the form that is shown below. The form may be filled out by any competent person. At Buick it's usually a maintenance or machine repair foreman, aided by a production supervisor (for production equipment) or works engineering supervisor (for buildings and utilities). A two-page instruction bulletin makes clear all terms and requirements.

Data on the form represent an analysis of what a local man thinks needs PM attention, and how often, also estimated time each task will take. This survey may be made on one facility in any Buick area today, and on another facility elsewhere tomorrow. No campaign or organized project is required.

To spur PM application, plant supervisors have received a guide to selection of physical items that will profit therefrom. The guide says a facility is a candidate if . . .

. . . its failure will shut down integrated units.

. . . it's the only equipment available for the job.

. . . it must be continuously available for an indirect activity.

. . . its characteristics or environment demand PM.

. . . it has high value needing protection.

. . . its malfunctioning, due to lack of maintenance, affects Buick quality.

. . . it's an important property or building-service installation.

How does a man decide on inspection frequency? He considers manufacturers' recommendations, but amends them to suit environment and to comply with his knowledge and experience with the specific equipment. Frequency is indicated numerically on the form by the weeks of the year an inspection or service is due. For example, under "Schedule Code" (see form) the item reading 4-04 indicates a frequency of 4 weeks beginning with the fourth week of the year as the base week. This dovetails with "Scheduling Week Numbers" (first column) of 4-8-12-16-on through 52.

This mode of field survey allows a build-up of PM tasks at any rate desired, fast or slow. We can get any factory or area into the PM system by introducing only one facility, then keep adding as PM demonstrates its value. Additions are showing an orderly growth—coverage to date at Buick is about 25% of all facilities. We don't know what it should be, but certainly not 100%. There are many items, such as fractional-hp. motors, where PM doesn't pay.

The same survey form also serves as a change notice, for corrections or concellations of items. As the program progresses we often find we've been either too conservative or too liberal in our judgments. One clue to a need for retrenchment is the constant repetition of "all o.k." notations on inspections. Or vice-versa, a repetitive adjustment or repair can be a warning that frequency must be stepped up. To that end the PM director constantly reviews inspection reports, even to the elimination of unjustified items. And so the system is continually revised, modified, and updated.

Master Schedule. All new field surveys flow to the PM director for checking prior to preparation of a set of punched cards for a master schedule. The survey must identify each item by facility number and description, also sub-assembly number and description and component description. By the use of three types of cards—one each for a facility,

Turn the page

SCHEDULE OF PREVENTIVE MAINTENANCE

Date 5-20-61

Sheet 1 of 4

P. M. By Facty. 06	P. M. For Facty. 06	P. M. By Dpt. 73	P. M. For Dpt. 10	Bay 02	SEC 0	Facility Description: Plating Machine, 20 station, rack	Bld. No. 41	Control

Component description, Schedule week numbers	Sub assembly	Part affected	Reason for action	Action	Schedule Code	Shift	Trade	Est. Time Hrs.	Est. Time Min.	I.B.M. Control
Chassis, Lift Mech										
4-30	Gear, Assm.	Shaft	Preventive	Lubricate	4-26	2	MW		30	
2-4-6-8 → thru 52	Lifting Mech.	Chain	Preventive	Lubricate	2-02	2	MW		10	
4-8-12-16-20-24-28-32-36-40-44-48-52	Slide	Guide	Preventive	Lubricate	4-04	2	MW		20	
33 only	Slide	Roller	Alignment	Inspect	33-52	1	MW	2	00	
Delay, 2 dips										
4-8-12-16-20-24-28-32-36-40-44-48-52	Slide	Guide	Preventive	Lubricate	4-04	2	MW		20	
Disposal, Cyanide										
26-52	Dogs	Electrode	Wear	See Guide No.	26-26	2	EL		40	
13-26-39-52	Motor-Dr.	Bearing	Preventive	Lubricate	13-13	1	EL		20	
4-8-12-16-20-24-28-32-36-40-44-48-52	Pump	Bearing	Preventive	Lubricate	4-04	1	EL		10	

This form is the heart of Buick's profitable PM

FACTORY | DEPT. | WEEK NO. | BEGINNING

PREVENTIVE MAINTENANCE SCHEDULE

BUICK MOTOR DIV. G. M. C. FLINT, MICHIGAN

FACILITY

FACILITY OR BUICK NUMBER	BY FACT.	FACILITY DESCRIPTION	BLDG.	JOB INFORMATION NUMBER	FOR FACT.

COMPONENT

BUICK NUMBER	BY FACT.	COMPONENT DESCRIPTION	JOB INFORMATION NUMBER	FOR FACT.

WORK TO BE PERFORMED

SUB-ASSEMBLY	PART AFFECTED	REASON FOR ACTION	ACTION TO BE TAKEN	TRADE
	70 DRIVE		732001A	Idler sprocket is worn and out of line
DRIVE	COUPLING	PREVENTIVE	INSPECT	OK
DRIVE	CHAIN	PREVENTIVE	INSPECT	Worn
DRIVE	SPROCKET	PREVENTIVE	INSPECT	OK
SPEED RED	LUB SYS	PREVENTIVE	INSPECT	OK
***730148	70 TAILING PAN CONV		70 *732019C***	OK
	70 CONV ASSM		732019C	
CONVEYOR	WHEEL	PREVENTIVE	LUBRICATE	Several wheels yet to be changed
CONVEYOR	CHAIN	PREVENTIVE	INSPECT	OK
	70		732019C	Speed reducer sprocket worn
DRIVE	BELT	LOOSE	TIGHTEN	OK
DRIVE	CHAIN	PREVENTIVE	LUBRICATE	Worn
SPEED RED	LUB SYS	PREVENTIVE	INSPECT	OK
***730149	70 INCLINE TAILING BELT		70 *732019C***	Head pulley bearings need changing. Take up bearings need changing
	70 CONV ASSM		732019C	
CONVEYOR	LACING	PREVENTIVE	INSPECT	Broken - needs repair
CONVEYOR	BELT	LOOSE	TIGHTEN	OK
CONVEYOR	IDLER	PREVENTIVE	LUBRICATE	OK

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WHITE
TAPES
Sizes from 6 ft. to 12 ft.

NOW EACH IN
BELT
HOLSTER

CLIPS ON BELT!

Now, Evans gives Industry more big savings in measuring tapes! Greater convenience and performance — with no increase in cost! Every Evans pocket tape, push-pull and power models, comes packaged in a strong, metal-reinforced vinyl-covered holster with belt clip. Makes measuring faster, tapes always handy. Your supplier will gladly demonstrate. Ask him about this Evans "extra" today.

YOUR COMPANY NAME ON TAPES...

Evans tapes can be supplied with your company name and advertising on each tape for presentation to your customers. It's a wonderful way to build good will. Available in individual gift package.

Send for illustrated folder #5807.

Evans RULE CO.
Factories at:
Elizabeth, N. J. & Montreal, Quebec

. . . PM PROGRAM
Begins on page 236

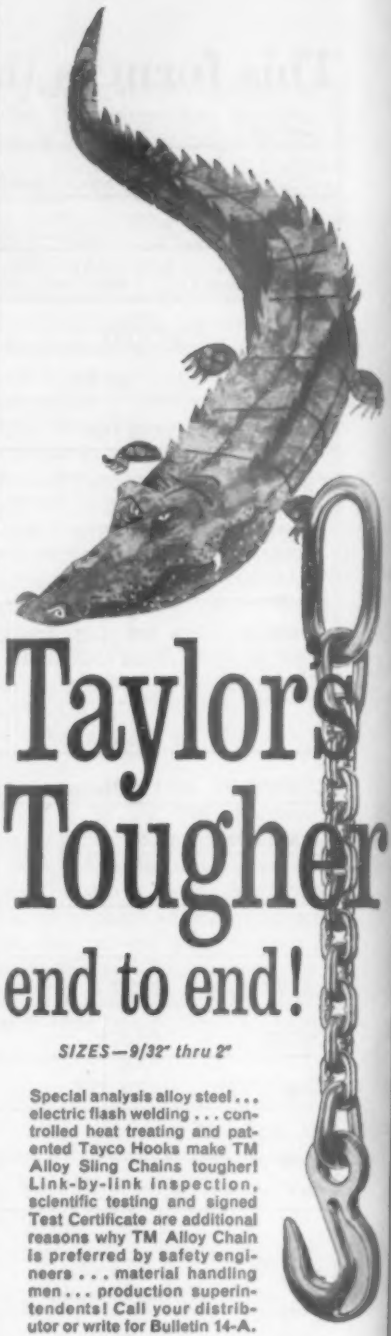
sub-assembly, and component—we contrive to actually transfer every line of information supplied the field survey to our punched card files. This operation provides a master file from which we can automatically extract and tabulate all cards calling for a PM action in any given week.

Weekly Assignment

Each week the PM director gives to each PM coordinator a tabulated run (in quadruplicate) of all PM actions due in his area the following week. The run automatically groups all items by factory, department, and bay location. Also, all sub-assemblies of one facility appear together, and all components of one sub-assembly are itemized in one group. Here then is the equivalent of a combination PM schedule and route sheet. See a typical section on page 239. Note how closely it resembles the original field survey.

The weekly package is passed on to one or more maintenance or repair supervisors handling the type of work. Each of the four copies serves a purpose: First copy—planning sheet. This copy alone shows the trade, estimated time, and shift, to help the foreman assign and control his work. The second, third, fourth copies serve a threefold purpose. Each copy is given to a mechanic as an assignment sheet. In some cases copies are cut into parts where several mechanics are involved. The mechanics write in what they have found, what they did, and what should be done, then return their copies to their supervisors as a report. The supervisors re-assign any unanticipated work (over 30 minutes) through the regular work-order procedure, and send one set of the completed schedule to PM director. All mechanics' comments are previously copied onto this one set. The PM director calculates performance as to percentages of tasks completed and of "discoveries" (more on these later), marks these scores on the cover sheet and returns the set to the interested maintenance department to serve as a record.

Turn the page



Taylor's Tougher end to end!

SIZES—9/32" thru 2"

Special analysis alloy steel . . . electric flash welding . . . controlled heat treating and patented Tayco Hooks make TM Alloy Sling Chains tougher! Link-by-link inspection, scientific testing and signed Test Certificate are additional reasons why TM Alloy Chain is preferred by safety engineers . . . material handling men . . . production superintendents! Call your distributor or write for Bulletin 14-A.

Chain is our specialty—not our sideline!

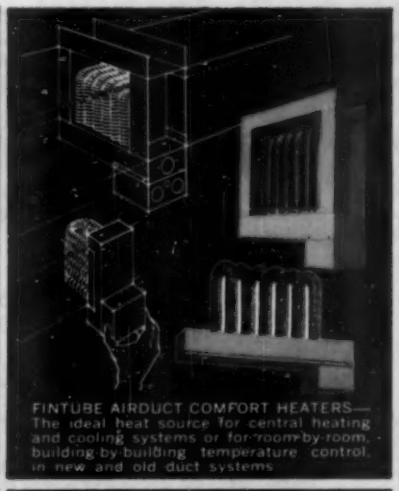
Taylor Made CHAIN SINCE 1873

S. G. TAYLOR CHAIN CO., Inc.
General Office: Hammond, Indiana
Plants: Hammond, Ind., and Pittsburgh, Pa.

CHROMALOX ELECTRIC COMFORT HEATING

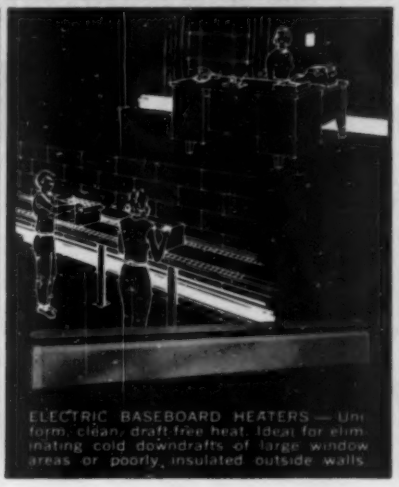
Clean, low cost, draft-free, maintenance-free heat for every imaginable comfort heating problem

CONTROLLED BEAM INFRARED COMFORT HEATERS — Beam the heat where it's needed into exact "working zones" indoors or out. Positive comfort, easy installation, weatherproof.



FINTUBE AIRDUCT COMFORT HEATERS — The ideal heat source for central heating and cooling systems or for room-by-room, building-by-building temperature control, in new and old duct systems.

HEAVY DUTY UNIT HEATERS — Keep men and materials at the right "working temperatures" for efficient production in large areas. For wall or ceiling mounting.



ELECTRIC BASEBOARD HEATERS — Uniform, clean, draft-free heat. Ideal for eliminating cold downdrafts of large window areas or poorly insulated outside walls.

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BALTIMORE, MD.	Hopkins 7-3280
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BUFFALO, N. Y.	Phone TT6-4000
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CHATTANOOGA, TENN.	AMherst 5-3862
CHICAGO, ILL.	Harrison 7-5464
CINCINNATI, OHIO	Trinity 1-0605
CLEARWATER, FLA.	Phone 446-7706
CLEVELAND, OHIO	Prospect 1-7112
COLUMBUS, OHIO	AMherst 7-8260
COLUMBIA, S. C.	Phone 256-6057
DALLAS, TEXAS	Riverside 8-9004
DAVENPORT, IOWA	Phone 326-5233
DENVER, COLORADO	Glendale 5-3651
DES MOINES, IOWA	CHerry 3-1203
DETROIT, MICH.	KEnwood 8-2100 ELgin 7-0677
HOUSTON, TEXAS	CApitol 5-0356
INDIANAPOLIS, IND.	Melrose 5-5313
KANSAS CITY, MISSOURI	Victor 2-3306
LOS ANGELES, CAL.	LUdlow 9-6321
MIDDLETOWN, CONN.	Diamond 6-9606
MILWAUKEE, WIS.	Broadway 1-3021
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NEW YORK CITY, N. Y.	WOrth 4-2990
OMAHA, NEBRASKA	341-7600, 7610
PHILADELPHIA, PA.	GReenwood 3-4477
PITTSBURGH, PA.	EMerson 1-2900
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Chromalox Electric Comfort Heating Equipment gives quiet, clean, safe, maintenance-free comfort. It costs less to install; and because chimneys, ducts, boilers and boiler rooms are eliminated—you have more usable work area. Whether your needs are for heating entire buildings, for spot comfort heating in exposed areas, for portable units for temporary use, for ceiling mounted radiant or unit heaters, for permanent built-in perimeter baseboard panels, fan-driven wall insert heaters or unit ventilators . . . there is a Chromalox electric heating system which efficiently and economically solves your needs. Get in touch with your representative for more information.

FOR MORE INFORMATION
Write for Catalog F-975E.
It gives answers to permanent or temporary efficient electric comfort heating—indoors or outdoors.

WI-34

EDWIN L. WIEGAND COMPANY
7518 THOMAS BLVD., PITTSBURGH 8, PA.

CHROMALOX ELECTRIC HEAT

PROCESS COMFORT

For more facts Circle 549 on Reader Service Card

• *Latest mechanical features*
• *Newest techniques in manufacture*
• *Most advanced high strength materials*

PRIME-MOVER PALLET TRUCK

Prime-Mover Pallet Trucks represent the latest engineering design—most efficient production techniques—strongest modern materials. Fewer and stronger parts mean longer, trouble-free, dependable service and performance.

The sealed hydraulic system is precision machined with ground finishes to maintain positive, leak-proof operations. All wear points are cast and machined rather than formed or stamped. Up-dated and made to traditional PRIME-MOVER high standards.

MODEL P-25

$359

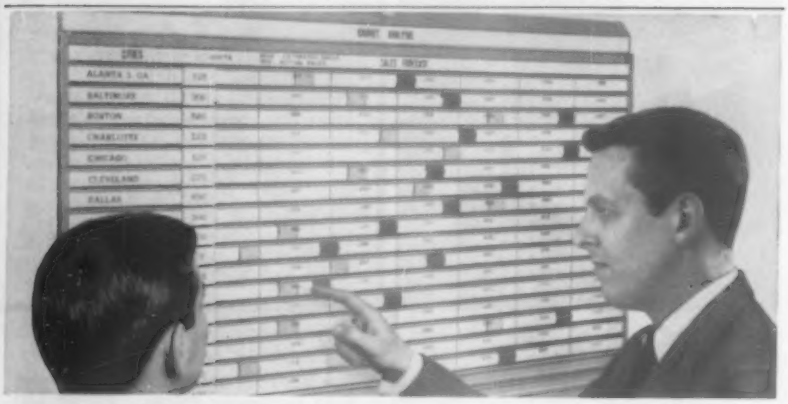
MADE IN TWO SIZES:
2500 lb. capacity, Model P-25
4500 lb. capacity, Model P-45

Available in 20½ and 27 inch widths; in 36, 42, 48 inch fork lifts. Model P-25 costs only $359; Model P-45 costs only $395.

Manufactured in Muscatine, Iowa by the PRIME-MOVER CO. and sold by leading material handling equipment dealers throughout the country.

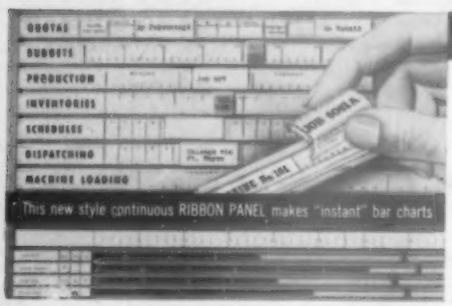
PRIME-MOVER

For more facts Circle 550 on Reader Service Card



Quickly chart management action, facts or trends with ACME VISIBLE CONTROL PANELS

Acme Control Panels adapt to your exact needs: Unlimited charting possibilities. Transparent colored signals flag due dates, reorder levels, quotas, goals. Signals slide smoothly . . . override or by-pass each other.



ACME VISIBLE

ACME VISIBLE RECORDS, Inc.
3110 West Allview Drive, Crozet, Va.
Please give me colorful booklet on new Acme Visible Visual Control Panels and their many uses. I am interested in _____ type of record.

NAME _____ POSITION _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZONE _____

For more facts Circle 551 on Reader Service Card

. . . PM PROGRAM

Begins on page 236

Most assignments call for inspections—to seek for defects and correct them. No checklists are used—the tab schedules are usually sufficiently pointed. Whenever specific detailed procedures must be followed Buick has been developing instructional "Bulletins" to be kept in local maintenance files for ready reference. In such cases, the schedule indicates this by the word "Bulletin."

Preparation of the weekly schedules for the entire Buick complex takes one girl 3 to 4 hours a week, including actual machine tabulating time. The maintenance supervisors like these schedules, have gotten to depend on them. They can see at a glance when any task was done last, when it will be due again, and the time involved. They can plan a week ahead, and are allowed one week's grace on difficult jobs. What's more, the mechanic has clear, written instructions on what to do, and where. And as part of his assignment he is asked to take credit for what he does by writing it on the sheet. Here are other notable advantages.

- In case of shutdown, a composite schedule will not repeat items that appear more than once in the intervening period.
- In anticipation of a model change, an advance schedule will show jobs to be done, hence crew sizes needed.
- At any time, an annual run will show imbalances in PM workload.
- Because the system is based on a standard "four-term" schedule code it can be applied to any type facility (roof, machine tool, furnace, truck) in any operating plant, and understood by any supervisor or mechanic who might be transferred elsewhere in Buick.

Performance Control

The PM director keeps two simple loose-leaf records to trace weekly progress and performance of the PM program:

1. PM Hours. This is a bar chart, one for each of the 12 major facilities. It shows the updated weekly PM workload, in hours, as obtained from the totals given on the weekly

How many of these 12 losses can you cut with Penco-Planned shelving & lockers?

- ☐ Product Damage
- ☐ Poor Inventory Control
- ☐ Production Bottlenecks
- ☐ Excessive Handling Costs
- ☐ Insurance Costs
- ☐ Shipping Bottlenecks
- ☐ Waste Space
- ☐ Pilfering
- ☐ Plant Cleaning Costs
- ☐ Slow Order-filling
- ☐ Accidents
- ☐ Low Employee Morale

If your company is considering new shelving and lockers, look into Penco Planning before you buy. Your Penco representative can show you how Penco units can be used to control *up to 12 major drains on efficiency and profitability* . . . if your operations and requirements are studied in advance. Re-check the list above! The secret is not how many units you buy, but how well units are integrated into your operations as functional systems. Check the Penco installations shown here. Then get more details in our free booklet "12 Losses Penco Planning Can Control". It's filled with slants on how to make storage facilities pay off. Finally, before you buy any lockers or shelving, call your nearby Penco dealer for advice and for fast, efficient service.

One look tells you that these Penco-Planned lockers step up employee morale, cut housekeeping costs.

New Penco T-Line boltless shelving above covers 48,000 sq. ft. . . . speeds handling of 15,000 production items. It simplifies inventory of parts in process, and permits fast changes of layout. No tools are required.

SEND FOR THIS FREE BOOKLET TODAY

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PENCO DIVISION 424 Brower Ave., Oaks, Pennsylvania

Please send free booklet, "12 Losses Penco Planning Can Control." (No obligation, of course.)

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Please send also: ☐ General Shelving Catalog ☐ General Locker Catalog

PANNIER MASTER MARKING SURVIVES WATER, HEAT, PRESSURE IN FIRESTONE TIRE MANUFACTURE

(top) A cured tire being pulled from a tire mold at Firestone Tire & Rubber Co., Akron. The Pannier code markings are still clear after having undergone water washing, and the heat and pressure of molding.

(right) The Pannier Code Printer rolls continuously on the moving tread extrusion, providing clear, unsmudged marking of tire size, stock code, shift and date. Code printer characters are quickly and easily changed. A wide range of type size is available; special characters or trade marks can be obtained.

(right) Pannier marking is immune to the effects of the dash of cooling water that pours over the hot extrusion. Pannier marking inks are scientifically formulated for each specific use and physical factor.

Whatever the industry, whatever the marking requirement – printing, stamping, embossing, stenciling, branding, Pannier has the techniques and proven equipment to do the job. Pannier engineers will be glad to consult with you without obligation.

PANNIER MASTER MARKERS

170 Pannier Bldg., Pittsburgh 12, Pa.

. . . PM PROGRAM
Begins on page 236

schedules. Latest additions and deletions are automatically included. This record provides a comparison of one area with another. It shows high and low weeks, and in time shows growth in PM application.

2. Schedule Achievement. This is a weekly record kept for each major facility. It measures performance by two percentages: (1) assignments completed within second week, as against those scheduled, and (2) number of discoveries (or defects) found as against number of inspections. In a recent study of an 11-week period we determined an average weekly completion performance of 92.4%, and an average discovery score of 5.9%. The discovery figure included items such as broken wires, loose bolts, leaking glands, worn parts, malfunctioning units. The 5.9% reflected a wide range of single scores such as 18% for the foundry, and 1% for the service parts plant.

On occasion the PM director sends a "Summary of Results of Scheduled PM" to the plant superintendent. Besides the usual achievement figures such a report will itemize the specific nature of each discovery of a defect. (What better way to demonstrate the value of the program?) Or it will point up a need for engineering improvement as was evident in a 2-week foundry study that showed 40 bad bearings.

Wherever downtime is critical, that area keeps its own records. For example, both the foundry and engine plants issue daily reports on minutes available for production, and minutes not available, with reasons (maintenance, lack of materials, broken molds, electrical troubles, and so on). One machine repair group records all jobs done, and types of failures. Such supplementary records help promote PM.

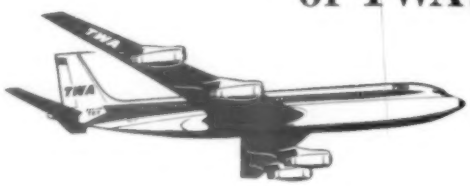
As yet Buick does not keep 100% equipment records that might show repetitive defects and out-of-line costs. We expect to expand this later. But right now we feel our efforts are better employed in building up the various facets of the PM program to their full stature. Our results so far show that big savings are ripe for the picking.

END

For more facts Circle 553 on Reader Service Card Circle 554 on Reader Service Card for items on next page

• *Larger than three football fields, Trans World Airlines' new multimillion-dollar jet maintenance hangar at Los Angeles International Airport was designed by Holmes & Narver, Inc., of Los Angeles, working with TWA's Facility Design, under direction of E. T. Phillips. Diversified Builders were General Contractors. COLOR DYNAMICS was used by Murray Painting Co.*

How Pittsburgh COLOR DYNAMICS® adds to efficiency of TWA's giant new maintenance hangar



- **Relieves eyestrain and nervous tension**
- **Improves morale of workers**
- **Reduces accident hazards**
- **Costs no more than ordinary painting**

• **Increased efficiency, better morale, greater safety!** These are the principal benefits TWA gained through the use of Pittsburgh COLOR DYNAMICS . . . benefits *you* can count on, too!

• **Based on human reactions to the energy in color,** this modern painting system makes it possible to *scientifically* select colors that contribute to greater productivity.

• **Cool colors of high reflectance** make work areas bright and cheerful, help workers see their tasks better. Focal and eye-rest colors on machinery lessen eyestrain and nervous tension. Safety colors on machinery controls and material-handling equipment help reduce dangers of time-loss accidents.

• **Why not ask us** how you can enjoy the advantages of COLOR DYNAMICS—at no greater cost than ordinary maintenance painting?

• **Send coupon for free copy of booklet** which explains what COLOR DYNAMICS is and how it can be applied. If you wish, we'll also gladly prepare a detailed color plan of your factory without cost or obligation.

PITTSBURGH® PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

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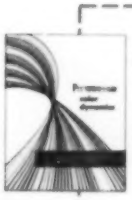


Pittsburgh Plate Glass Co., Paint Div., Department F-101, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your booklet "COLOR DYNAMICS."

☐ Please have your representative call for a COLOR DYNAMICS survey without obligation on our part.

Name _____

Street _____

City _____ County _____ State _____

If you use 40-watt fluorescent lamps here's money-saving news from General Electric

It's the brightest 40-watt cool white fluorescent ever made. With the General Electric NEW F40 you get a 7% bonus in light at *no extra cost.* This extra light is worth 15¢ to 30¢ a lamp to most users. Yet the price of this lamp is the same as for ordinary fluorescents that give less light.

Now you can increase your present lighting level without spending a single extra penny for lamps, fixtures or electricity. Or, if you're putting in a new lighting installation, you can get the light level you want with fewer lamps and fixtures.

General Electric scores another first in offering you this bonus in standard 40-watt "white" fluorescent lamps. The G-E NEW F40 is rated at 3100 lumens in popular cool white, 3250 in white or warm white. That's because of three light-producing G-E Premium 3 construction features available for the first time in a lamp that sells for the same price as ordinary fluorescents—

only $1.30 for cool white, $1.35 for other "white" colors:

1. G-E wattage-miser electrode helps convert power ordinarily lost in the cathode into useful light—free.
2. New, more efficient gas mixture.
3. New electronically screened bonus-phosphor.

NEW F40 is rated at 7500 hours in Rapid Start and starter-type circuits (6000 in systems installed before 1954). In pre-'54 circuits use F40/54 lamps. You'll get 7500-hour life, same light as ordinary 40-watt fluorescents (2900 lumens) at the same price ($1.30 cool white). General Electric Co., Large Lamp Dept. C-123, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW F40 ONLY $1.30 LIST

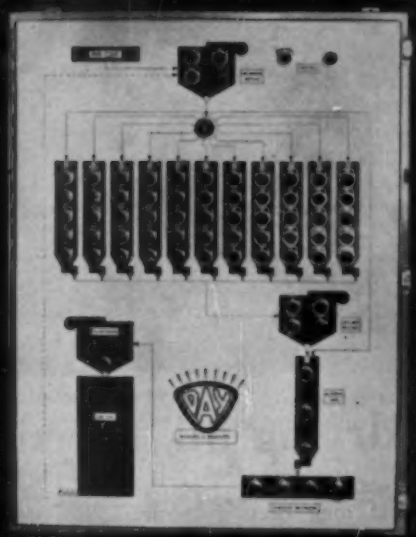
For more facts circle 555 on Reader Service Card

High density pneumatic conveying system for unloading polyethylene pellets from railcar. After piping connections are made, dual-purpose DAY "RJ" receiver, shown right in photo, "pulls" product from railcar and "pushes" it to storage tanks or manufacturing process.

PUSH A BUTTON

START

UNLOAD A RAILCAR



DAY Control panel — your most efficient link between railcar and plant, storage or process.

Save manpower, time and money unloading railcars with DAY *air-line* pneumatic conveying systems. They provide a sanitary, low cost way to unload, transport in-plant, mix, dry, cool or load any type of dry material. DAY *air-line* pneumatic conveying systems are pneumatically conveying close to 200 different products. Take advantage of this DAY experience. Discuss your pneumatic conveying and plant storage equipment requirements with DAY. Only DAY offers a complete service, including: *engineering, fabricating* and *installation* of *everything* (including bulk storage tanks) needed for efficient, economical systems.

FREE bulletin describes all types of pneumatic conveying systems. It tells how you can make substantial savings 9 ways and improve plant efficiency 6 ways with DAY *air-line* pneumatic conveying systems.

DAY SINCE 1881

equipment only or a complete system

CLIP AND MAIL COUPON TODAY

The DAY Company
850 Third Ave. N.E., Minneapolis 13, Minn.

In CANADA
The DAY Company of Canada, Ltd.
15 Brydon Dr., Rexdale (Toronto) Ontario

Please:

☐ Send Bulletin M-588 (Pneumatic Conveying Systems)

☐ Send Bulletin 574 (Tanks for Bulk Storage)

☐ Have DAY Representative Contact Me

NAME_____

COMPANY NAME_____

ADDRESS_____

CITY_____ STATE_____

MATERIALS NEWS

For more data, circle item numbers on Reader Service Card next to back cover.

Fast-drying ink speeds marking

Efficient marking on non-porous surfaces has long been a thorny problem for companies involved in product identification. A new fast-drying ink called All-Mark is now providing industry with a low-cost marking method.

Now, as shown, plastic containers, glass, metal, rubber or cellophane can be print-identified with little fear of smudging—right on the production line if need be. Since the ink dries in a matter of seconds, speed rates of 40 to 60 prints a minute are feasible. Companies doing multiple marking, such as small parts suppliers, should obtain immediate benefits.

The new ink suggests notable improvements for shipment addressing, inspection, toolroom, and quality-control marking, and automated product identification. *Weber Marking Systems Inc.* (Circle 195)

Heavy-duty braking at high temperatures

Here's a new organic friction material that provides positive control of brakes and clutches up to temperatures of 1000 F. According to the manufacturer, J-M style 160 practically eliminates "fading" under high temperature conditions. It is particularly suited to the severe-duty service of high loads and fast cycling.

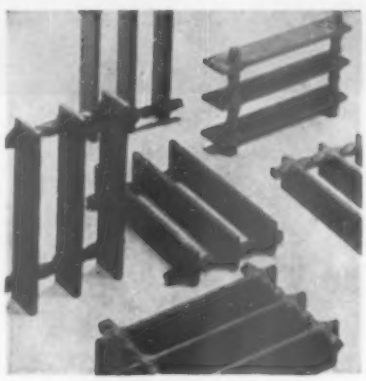
Tests indicate stable average coefficient of friction properties over a wide temperature range.

This rigid, molded material is tan in color, and comes in blocks, facings, and sheets. *Johns-Manville.* (Circle 196)

197—Epoxy coating prevents build-up of granular and abrasive materials on walls of bins and hoppers. Epoxy Resiweld is easy to apply, imparts a hard glass-like covering to surfaces. Coating is wear-resistant, covers 400-500 sq. ft. per gal. *Frederic B. Stevens, Inc.*

198—Corrosion inhibitor for open cooling water systems is colorless, non-staining, non-toxic in working strengths, and low-priced. Designated Ionac Formulas 1195 (free-flowing powder) and 1495 (briquet), inhibitor may be used in sanitary sewers. *Ionac Chemical Co.*

199—Packaging material, called Hewfoam, is a rigid urethane used for economical packaging and safe shipping of odd-shaped, fragile or expensive products. The container conforms to product shapes, is lightweight, moisture-resistant, and insulating. *H. E. Werner, Inc.*



Low upkeep grating

Fusing a new ceramic coating to steel industrial grating results in a matte-type finish that offers numerous benefits: maintenance-free installation—never requires painting except for mechanical damage; resistance to most acids, alkalis, and caustic exposure; built-in safety with non-skid surface.

Cost is slightly above that of hot-dipped galvanizing. *Allied Material Supply Co.* (Circle 200)

Turn the page

As good as your signature

There was a time when a seal was as authentic as a signature: it identified beyond any doubt the source and genuineness of the document that carried it.

There was also a time when a manufactured part, a complete assembly or its package needed only the maker's name and perhaps a single number, for everyone to know who made it, what it was for and how they could buy another one.

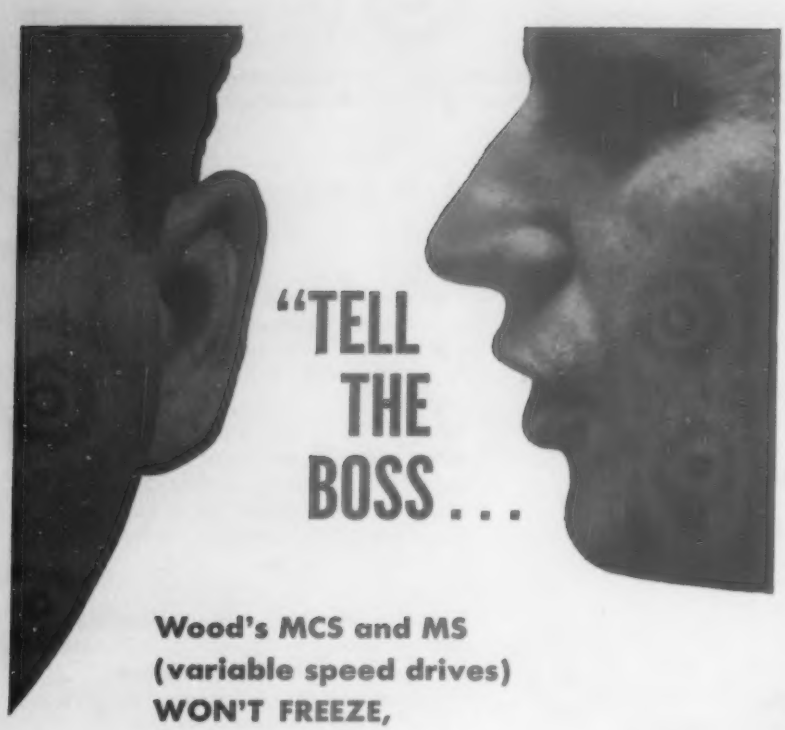
These days there are too many competing parts and products . . . too many look-alikes with important but invisible differences . . . and too great a need to convey information — to allow any *one* product *not* to carry complete identification. And while you know you must print information on your product, label it, tag it, stamp it or put a decal on it — are you getting *all* the advantages of the *best* and *most economical* identification method for your particular needs? Should you change from labels to printing your products? Could one label replace two? Would it save you money to couple product identification with final assembly or packaging? Could you profitably preprint fixed information in quantity and later imprint variables to meet needs?

We can help you find the one *best* answer to suit your specific needs, and probably provide standard equipment to make product and package identification a more effective and efficient operation for you. It has been our entire business for 50 years, for every industry. Write Markem Machine Co., Keene 18, N. H.

This helpful booklet shows how to achieve more informative, more profitable marking in your plant. Write for your free copy.

MARKEM

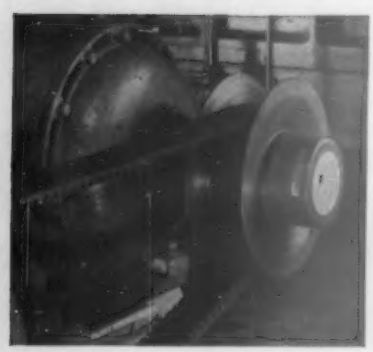
HELPS YOUR PRODUCT SPEAK FOR ITSELF



"TELL THE BOSS . . .

Wood's MCS and MS (variable speed drives) WON'T FREEZE, WON'T STICK"

And, remind him that Wood's MCS and MS motion control drives solve production and maintenance problems no other mechanical variable speed drives can handle. They won't freeze or stick because there are no keys to obstruct lubrication of bearing surfaces. Revolutionary resilient cam followers or pads, located outside the bearing surfaces, permit continuous rotational pumping action, assure even distribution of oil. And, you check lubrication only three or four times a year. Also, Wood's MCS drives hold constant driven speeds under varying torque loads.



Wood's motion control, variable speed drives are available in capacities from fractional to 25 hp. If you and the boss want more information about these remarkable drives, write for BULLETIN 25103.

Woods

T. B. WOOD'S SONS COMPANY • CHAMBERSBURG, PENNSYLVANIA

MCS/2361 ATLANTA · CAMBRIDGE · CHICAGO · CLEVELAND · DALLAS

For more facts Circle 558 on Reader Service Card

Begins on page 248

MATERIALS NEWS

For more data, circle item numbers you want on Reader Service Card.

201—Descaling solution bright-dips stainless steel at the same time. The new solution (No. 205 Stainless Descaling) removes welding and heat-treating scale, brightens surface finish, and yet holds close tolerances. No current required. *Fidelity Chemical Products Corp.*

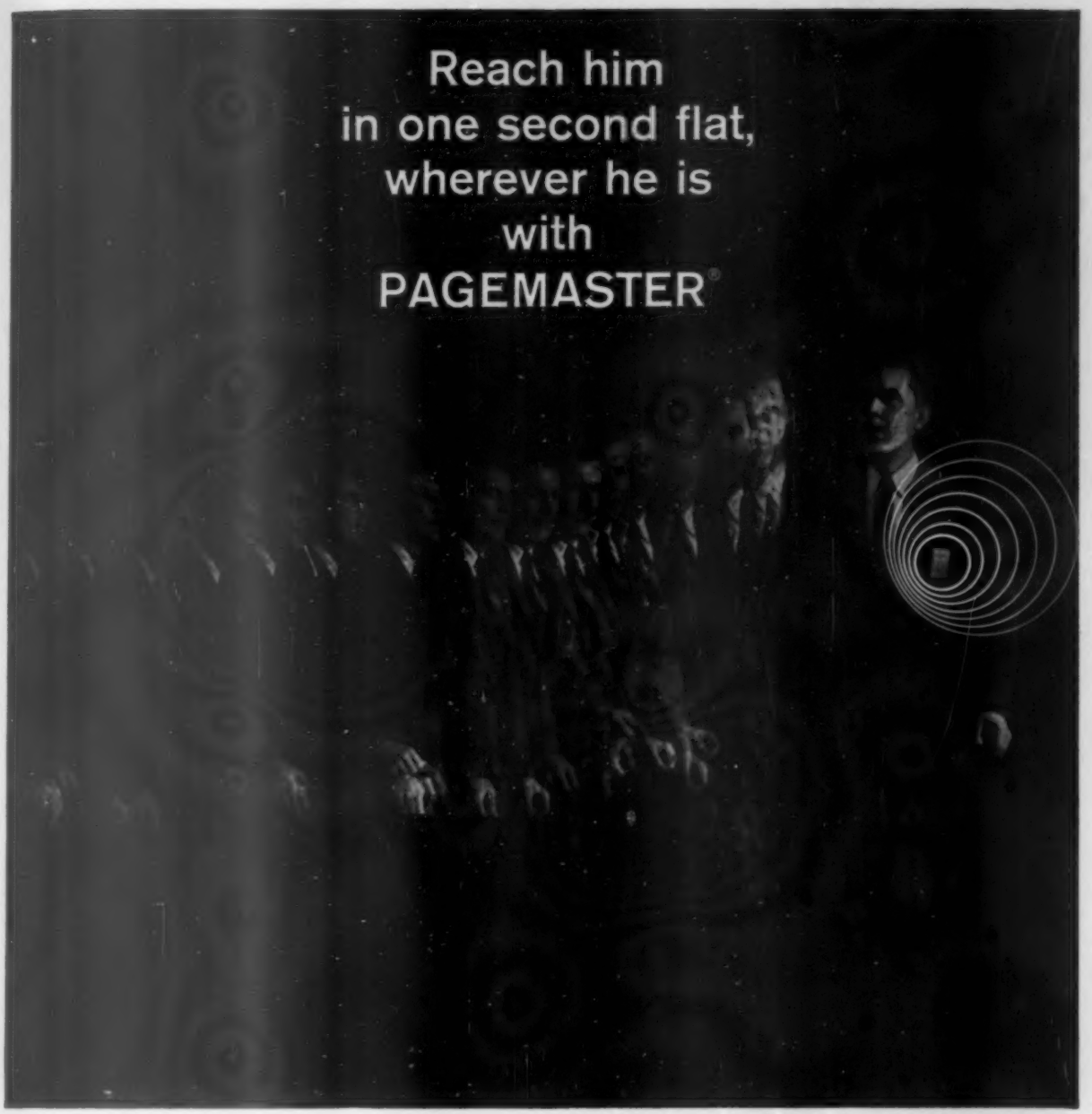
202—Adhesive, called EC-1828, bonds a number of materials. It has synthetic-rubber base, is a spray-applied, high-strength, heat-resistant adhesive; needs only contact pressure to bond. Shown is technique on honeycomb-sandwich panel. *Minnesota Mining & Mfg. Co.*

203—Aluminum oxide abrasive combined with a vitrified bond (V8) results in new grinding wheel, RA Borolon. The ruby-colored wheel has toughness yet is soft, and performs well on hard tool steels, including abrasive-resistant types. *Simonds Abrasive Co.*

204—Paint spray booth coating enables overspray accumulation to be removed easily. Paint Guard is a non-tacky paste, odorless, non-toxic, and non-flammable. Can be applied by brush or spray. It forms a coating of high light-reflectance and low specular gloss. *Kelite Corp.*

205—Tungsten alloy system greatly improves oxidation resistance and hardness properties at 2190 F. Research report indicates considerable promise of tungsten-columbium-tantalum system for elevated temperature structural applications. *Union Carbide Metals Co.*

Turn the page



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KALAMAZOO

The "BIG K"

Now, after more than four years' research, Kalamazoo brings to you the all new Model 14A — horizontal metal cutting bandsaw. Incorporating some 30 shop proven, cost saving features, this hydraulic driven, heavy duty bandsaw offers cutting capacity and ability in excess of any cut-off method, at far less tool cost per square inch of cutting.

Most important among these profit producing features are: positive control force feed; clockwise blade rotation to reduce teeth shock — increase blade life; convenient 36" machine height to reduce operator fatigue; large 14" x 24" capacity; push button control; dual movable vise jaws; adjustable blade tension.

For complete details on this amazing new machine tool, phone, write or wire your Kalamazoo representative. Facilities for test runs of your material on the "Big K" are at your disposal — at no obligation.

MACHINE TOOL DIVISION
Kalamazoo Tank & Silo Company

508 Harrison St.
Kalamazoo, Mich.

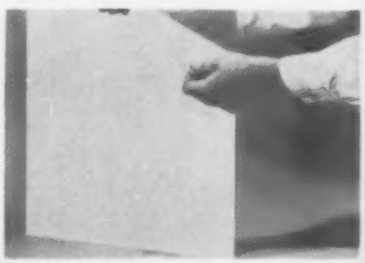
Begins on page 248

MATERIALS NEWS

For more data, circle item numbers you want on Reader Service Card.

206—Emulsifier, called MM-17, effectively removes heavy deposits of oil sludge from storage tanks and pipe lines. Penetrants drive solvents through and under sludge. When water is applied, sludge particles become suspended in emulsion form. *Rockland Industries, Inc.*

207—Rustproofing oil has been developed for temporary protection of metal parts during work-in-process manufacturing operations. Entek RPO-12, a thin, organic liquid, at full strength can withstand 40 hours exposure to salt spray. Economical as a dipped operation. *Enthone, Inc.*



208—Protective paper, a new cleanly removed tacky material, protects highly polished or machined surfaces during handling and installation. It is self-adhesive, both translucent and markable for easy parts identification, and work-in-process routing. *Fasson Products.*

209—Trickling filter uses new corrugated plastic sheets packed for treatment of water-borne wastes. The plastic, called Dowpac 20A, formed in 36x21-in. two-direction corrugated sheets, permits self-spacing when installed in aerating towers. *Dow Industrial Service.*

210—Transparent PVC tubing, designated Clearflo, is low-cost, nonporous, with smooth surfaces to resist corrosion, bacterial growth, and staining. Recommended usage: active chemicals. Food grade (Clearflo F.G.) is ideal for filling machines. *Newage Industries, Inc.*

Turn the page

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HOW TO KNOW IT ALL

Versatile Produc-Trol can give immediate and complete information on almost every phase of production. No recourse to files is needed; with Produc-Trol all the factors of efficient production are scheduled before your eyes — you have the right answer every time.

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how to select a dust collector

This new brochure includes all basic information needed to select the right dust or mist collector for grinding, buffing, polishing and other types of service. Write for your copy. No obligation.

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Protectoseal Safety Cans are more than safe containers for flammable liquids. Type for type, they are the most efficient means of storing, handling, and dispensing hazardous liquids in the plant or laboratory. Exclusive design and construction features make Protectoseal Safety Cans safer, faster, and easier to use, more economical to own. Made in types and sizes for every application. Strategically located warehouses give you direct-from-manufacturer service and quick delivery.

Write for 76 page manual and catalog on flammables engineering fundamentals and safety equipment.

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IN CANADA: SAFETY SUPPLY COMPANY, TORONTO

Begins on page 248

MATERIALS NEWS

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MATERIALS LITERATURE

211—LP-gas uses for portable, mobile, and stationary fuel-consuming equipment are illustrated in 20-page booklet. Includes engine-comparison tests; data shows engine life doubled, overhaul downtime reduced. *National LP-Gas Council.*

212—Leather packings for hydraulic pneumatic service are covered in 12-pager (AD-186). Offers tannage and impregnation information. Shows sizes, shapes of gaskets and washers. *Garlock, Inc.*

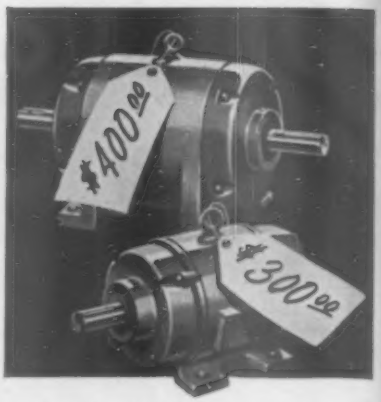
213—Buffing, polishing compound, in liquid or bar form, is described in Bulletin CO-105 (20 pages). For use in automatic or manual operations. Also discusses compound for finishing hard rubber and plastics. *Hanson-Van Winkle-Munning Co.*

214—RTV silicone rubber molding guide is an 8-pager (CDS-191) that provides step-by-step details for making industrial models and plastic tools. Includes helpful money-saving ideas. *General Electric Co.*

215—Rigid PVC products are covered in this 23-page catalog (RV-61). Gives helpful fabricating procedures, interesting case history applications, physical properties data. Photos of PVC exhaust hoods, stacks, ducts. *Kaykor Products Corp.*

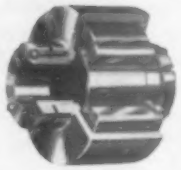
216—High-purity refractories of impervious recrystallized alumina resist chemical attack. Described in Catalog A61-1 (10 pages), uses of the ceramic include insulators, tubes, muffles, various furnace-type containers. *Morganite, Inc.*

217—Lubrication recommendations for machinery and equipment are outlined in a 4-page brochure (LMF-61). Lubricants range from lightest fluid types to heavy greases. Chart lists products by uses. *Lubriplate Div., Fiske Bros. Refining Co.*



CUT MOTOR COSTS

with "No Load" Centrifugal Clutches



Cushioned "no load" starts for high inertia and hard-to-start loads eliminate need for costly low voltage starting equipment, oversize and high torque motors and permit smaller, general purpose motors to be used.

- New design "A" Series centrifugal clutches are available for direct drive, shaft-to-shaft installations, also replace flexible couplings.
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For more details write for Centrifugal Clutch Catalog, or contact your local Formsprag distributor.

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Precision Power Transmission Products

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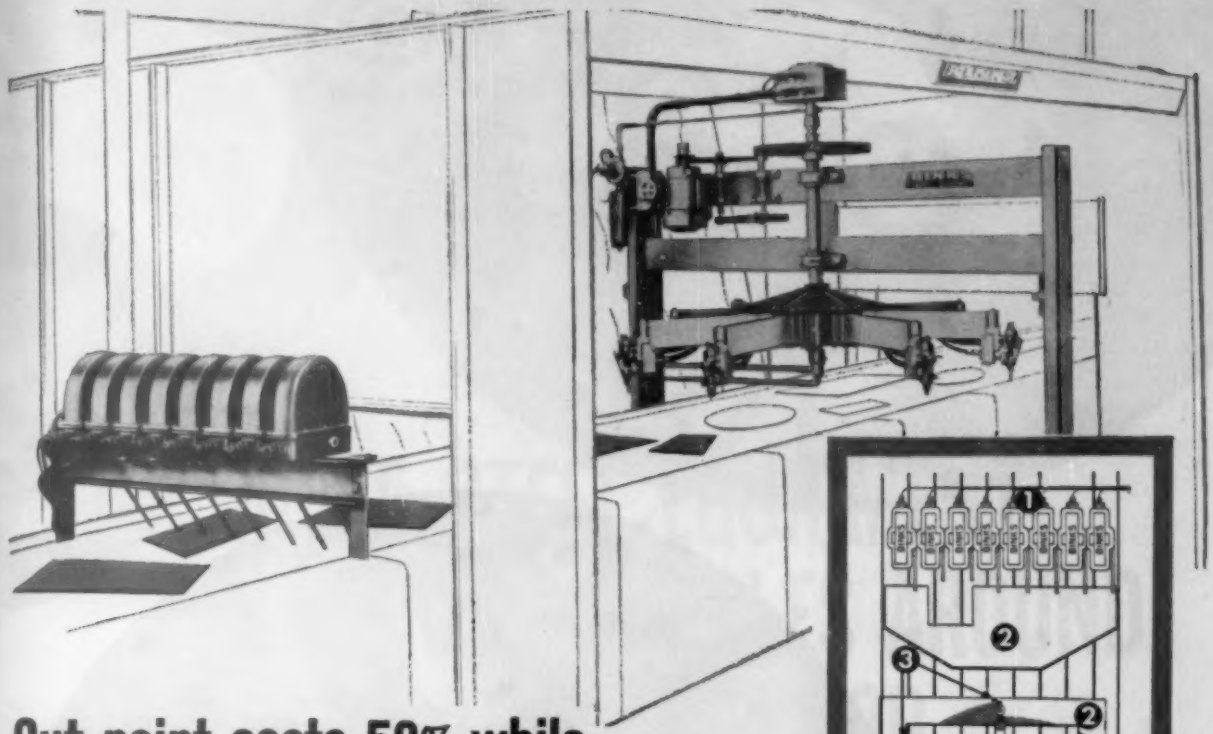


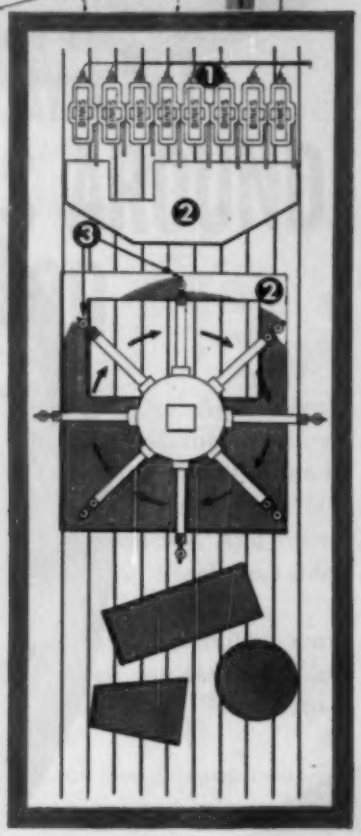
Cut paint costs 50% while spraying odd shapes up to 90 fpm

Tailor made automation at standard parts cost with Binks exclusive all new MEMORY TIMERS

Binks Memory Timer, a unique new electro-mechanical control mechanism, coupled with standard Binks spray equipment, gives you paint economies never before possible with automatic spraying . . . all without the expense of custom-made engineering.

The Memory Timer senses the size and shapes of objects passing beneath it on a conveyor and transmits the information to automatic spray guns. The rotating spray guns (available with 4 or 8 arms) operate only when the objects are in direct line of fire. Result: materials needed to finish a given run are drastically reduced (savings of 50% are not uncommon). Plus, you can spray up to 90 feet per minute with an 8-arm unit.

A precision instrument, the Memory Timer is unaffected by spacing timing and speed variations. Synchronized with conveyor movement, the timer stops, starts, increases or decreases speed without adjustments or resetting. Memory Timer units can be used singly, or in multiple units driven by a common drive to accommodate almost any conveyor width. Binks Memory Timer units are adaptable to most spraying machines already in service.



Here is how the system looks from above

(1) Binks MEMORY TIMERS astride your conveyor sense size, outline and location of (2) irregularly-shaped products to be sprayed and relay this information to (3) your automatically operated spray guns.

Ask about our spray painting school. Open to all . . . NO TUITION . . . covers all phases.

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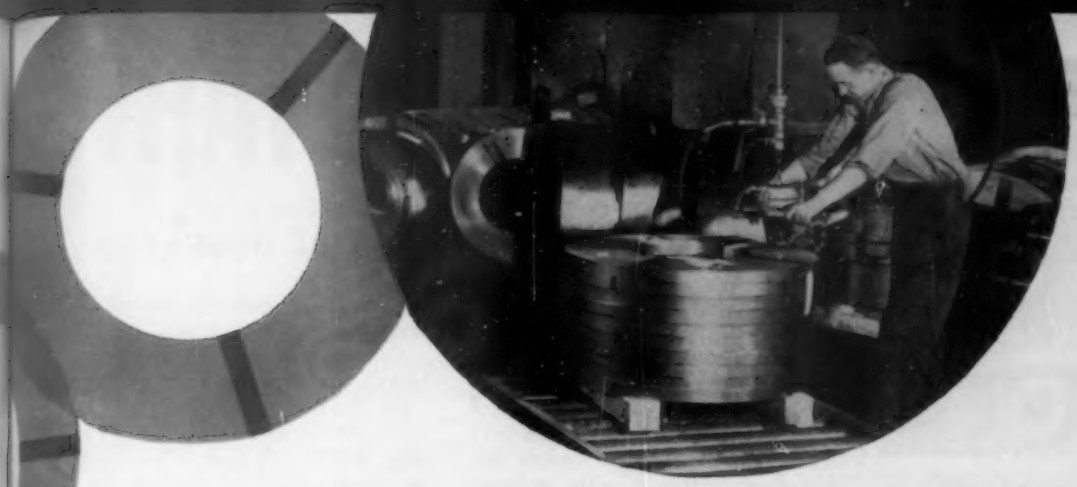
Send for Bulletins A96-1R and A96-4 for complete information or, call your Binks representative; he's as close as your telephone.

1338

Binks Everything for spray painting



ACME STEEL EQUIPMENT STRAPS CIRCLES AROUND ANY OTHER METHOD

In the slit coil field alone, dozens of producers are proving that Acme Steel automatic strapping systems are the most productive partner slitting equipment ever had. For instance, the new F4 Strapping Machine and Indexing Table (at left) let one man completely strap as many as 150 coils *of any width* per hour—all through push-button control. And once secured, coils are unitized just as efficiently with Acme Steel portable powered strapping tools.

Thanks to this rapid, non-stop flow, existing slitting equipment can run *continuously* at full capacity, eliminating the need for investing in additional slitting lines in many instances. No wonder Acme Steel automatic strapping equipment can pay off in 18 months!

No field has a monopoly on these savings. Acme Steel equipment is scoring unparalleled productivity gains in strapping giant hot coils, paper, textiles, products and packages of every description . . . in bundling and unitizing such products as lumber, building materials, bar stock, pipe and sheet metals.

Full facts on industry's most proven and productive strapping systems are as close as your phone. Call your Acme Idea Man for an evaluation of your particular operation. Or, write: Acme Steel Company, Dept. FACP-101, 135th Street & Perry Avenue, Chicago 27, Illinois.

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10 NEW PRODUCTS IN THE LAST 5 YEARS

258 Circle 568 on Reader Service Card

BOOKS

Stand back: managers at work

This sprightly volume is an unusually honest view of managers at work. It's not a how-to book unless you consider watching other managers in action is a means of learning. Certainly not profound, *How Managers Make Things Happen* covers the movements rather than the philosophy of management. Refreshingly different, it breaks sharply from the current crop of "be a nice fellow and get ahead" management literature. Author Odiorne's attitude: Forget some of your hand-holding chores and start stepping on a few more toes.

But don't dismiss Odiorne as a management agitator. Fast-moving as his text is, there are nuggets of shrewd observation sprinkled throughout. For example, he gives 10 ways to spot business stagnation (a lot harder to do from the inside of an organization than from the outside). His simple but penetrating observations:

Its officials are out of touch with broad trends.

It is unwilling to experiment; it's in love with the status quo.

It never looks beyond its own markets, but simply pushes its old products harder.

It demands great conformity from its people.

It neither rewards merit nor punishes failure (a civil service mentality).

Its managers and staff do little self-improvement.

It is inbred, isolated from new ideas and viewpoints.

It is overly obsessed with immediate profit.

It attracts passive and dependent people; there's a dull gray look of mediocrity throughout.

It is a boring place to work because it takes itself too seriously.

A heady realist, Odiorne dives into subjects most other management men won't admit exist. For example, managing cliques in the organization. Cliques are almost universal, yet they're still a taboo subject for some strange reason. Except here. They're treated naturally as a part of everyday business life—which they are, of course.

One chapter tells how to be a lucky executive. Ridiculous? Nope. Luck can be cultivated just like any other management talent, says Odiorne, and he tells how. A later chapter gives advice on how to pick a fight and win in business. Sound interesting? It is. (Reviewed by R. L. Grant)

How Managers Make Things Happen, by George S. Odiorne. Prentice-Hall, Inc., Englewood Cliffs, N. J. 218 pages. $4.95.

Personnel practices

Many of the bromides and assumptions so current in personnel work are shown a healthy *dis*respect in William Wolf's *The Management of Personnel.* But then it's written for supervisors, not for the personnel department.

To put his own practical experience in perspective, the author drew upon detailed studies of the no-nonsense practices of over a hundred organizations. Throughout, he bears down on practical techniques, rather than on theories. Instead of analyzing worker cliques, for example, the author tells you how to *use* them. Informal small groups, he points out, "constitute one of the best and easiest devices for social control of workers." If you must change people's minds, it's much easier to change them in groups than it is individually.

The author recognizes that "Managers do not deal with organizations in general. They deal with a given organization at a specific time, with established traditions, and with specific people." Each organization tends to develop its own character, or "personality," which must be understood for effective management of its personnel.

All through the book, the author shows why many of the pet concepts of personnel management just don't work in a shop full of real people. But far from being negative, he goes

WHAT'S BEST FOR BULK?

THIS CINDER PLANT OWNER HAS REPLACED HIS CONVEYOR SYSTEM WITH A FAST, BIG-CAPACITY CAT 966

Even the sound arithmetic of cost reduction doesn't tell the whole story. One thousand machine hours ago Victor Prep, President of this Frackville, Pa., cinder plant operation, decided to switch from a conveyor loading system to a mobile Cat 966—the largest of the Caterpillar line of wheel loaders (140 flywheel HP 966, 105 HP 944, 80 HP 922).

Prep's cost sheets and production records for those 1000 hours show that the 966 with a 4 yd. bucket has simplified his entire operation, stimulated production and cut handling costs. The 966 truck-loads up to 1400 tons of cinders a day and handles twice that tonnage working around the plant . . . it still has reserve capacity.

Maintenance, as Prep expected from the rugged Cat loader, has been strictly a few-minutes-a-day routine. The penny-pinching 966 has been working all day long on only 24 gallons of fuel. Add these low operating costs to the low purchase price and Prep's figures prove that he made a smart buy.

But figures are only part of the story. "Now," says Prep, "we have a high-reach machine which loads our big 20-yard trucks and railroad cars in a hurry . . . and then moves off quickly to another plant assignment." After 1000 high-production hours, his 966 has proved that it's always ready to go when he needs it.

Prep's operator is as sharp at 5:30 p.m. as he is in the morning . . . "I can operate the 966 for 10 hours and burn up no more energy than other loaders take for 7 hours' work." The wide-open 966 is safe, too . . . "You don't have to worry about sticking your head out of the cab when the bucket's in the air—lift arms and cylinders are out front where they should be."

Ask your Caterpillar Dealer to take an obligation-free look at your bulk handling methods. Let him prove, in black and white, how one of the three power shift Cat Wheel Loaders and their engineered attachments can fit your exact needs. He knows because he's been a heavy machinery specialist for years.

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CAT WHEEL LOADERS ARE MAKING OTHER LOADERS OBSOLETE

The Most Reliable, Long-Lived Cooling Equipment

● Every day this Niagara AIR-COOLED Heat Exchanger is adding $90 revenue while its owner's plant is in operation, from savings in the cost of cooling water.

For more than thirty years similar machines have been making such savings in industries all over the country. They do not wear out, are easy to keep clean and cost little for upkeep. Panel construction makes all parts accessible. Cleanable coils are available.

With the Niagara Aero® Heat Exchanger you have a closed system of cooling, free from dirt. Heat is removed at the rate of input, making it easy to control temperatures. The heat is dispersed into the atmosphere by means of evaporation of a very small amount of water, solving the problems of cooling water supply and disposal.

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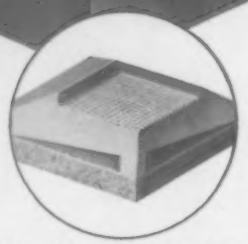

Used under feet of heavy machines to keep them quieter and steady—protects costly equipment.

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Begins on page 258

BOOKS

on to guide you around these pitfalls, telling you how to take advantage of the facts of life instead of fighting them. As he says, "Although the subject is infinitely complex, it must be dealt with." And he deals with it well. (Reviewed by R. W. Christian)

The Management of Personnel, by William B. Wolf. Wadsworth Publishing Co., Inc., Belmont, Calif. 378 pages. $6.95.

Wage administration

The long-standing gap between the personnel specialist's concept of job evaluation and the engineer's approach to job analysis and standardization is admirably bridged in *Wage and Salary Administration.* It's basically a college textbook, but it should find a welcome on most plant operations managers shelves. It integrates the many phases of wage and salary administration—job evaluation, employee appraisal, job standardization and work measurement, and incentive wages.

Wage and Salary Administration, by A. Langsner and H. Zollitsch. South-Western Publishing Co., Cincinnati, 726 pages. $7.50.

Cost reduction

Suggestions to guide a plant to immediate savings are one of the many side benefits of *Cost Reduction Guide for Manufacturing Management.* But its real purpose and value is as a manual for the company or plant that wants to set up or rejuvenate a continuing cost reduction activity. The authors are cost reduction consultants and give generously of their experience and knowledge.

The contents cover step-by-step instructions for starting and continuing cost reduction, including sample forms and reports. A 1200-question checklist will help find cost-cutting opportunities. Case studies illustrate the practical application of cost reduction principles and procedures.

Cost Reduction Guide for Manufacturing Management, by E. E. Wyatt and H. Clifton Morse. Hitchcock Publishing Co., Wheaton, Ill. 256 pages. $18.

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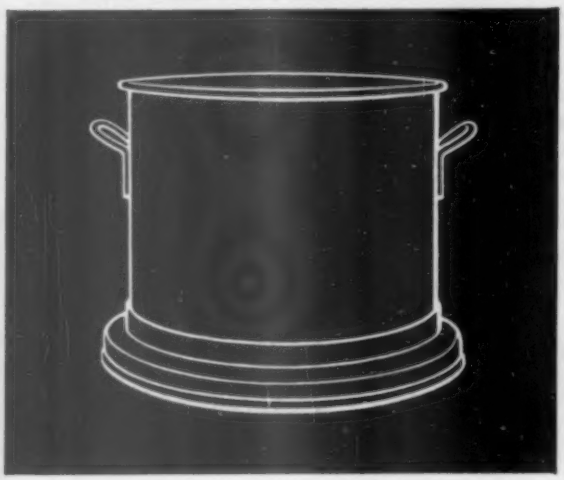

Let wear-ever store it

These Wear-Ever containers stack to save space. Or, covers are available. Extra-tough aluminum alloy won't rust, resists denting. Beaded rims protect workers' hands. Choose from Wear-Ever's wide selection of sizes: 2½-, 4-, 6-, 9- and 14-gallon capacity. Count on lightweight Wear-Ever aluminum containers to stand up to a long life of hard use—save yourself replacement costs. Send reply card for full details; or write Wear-Ever Aluminum, Inc., New Kensington, Pa. Immediate delivery from stock.

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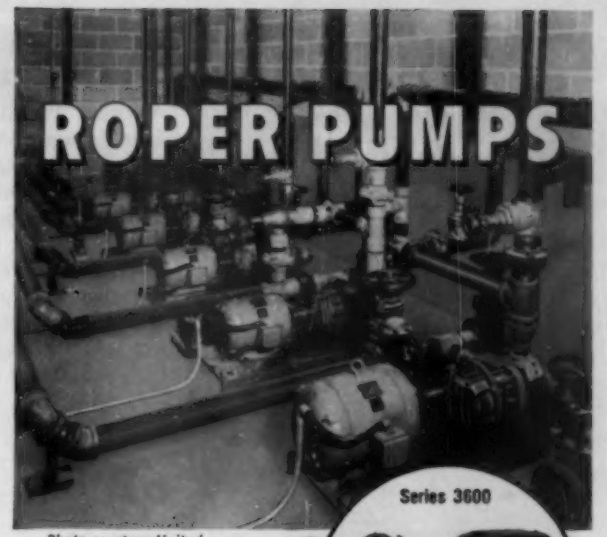
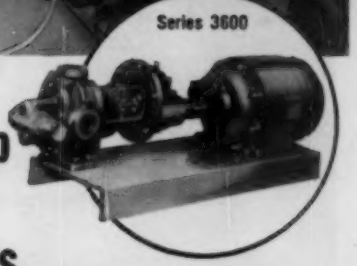


Photo courtesy United Paint Co., Memphis



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- **MACHINING** of all parts to close tolerances enable Roper units to withstand operating stresses during long service.
- **PRECISION-GROUND** steel shafts, perfectly proportioned and free of flaws are induction-hardened at bearing and packing surfaces.
- **HELICAL** pumping gears, hardened alloy iron and keyed to shafts with sliding fit, operate in axial hydraulic balance. Gear teeth are specially formed to assure efficient meshing and liquid transfer.

For full information, contact your Roper dealer

Send for "How to Solve Pumping Problems" booklet

ROPER
HYDRAULICS, INC.

Dependable pumps since 1857

COMMERCE, GEORGIA

For more facts Circle 574 on Reader Service Card

Reprinted by popular demand

KEEP PACE WITH ELECTRICITY
...a handy new G-E Maintenance Guide for Fluorescent Lighting that hangs on your wall or fits in your file. Available free from the makers of dependable General Electric Starters.

● **Lists trouble symptoms and remedies on easy-to-use chart.**

● **Helps you select properly matched components.**

This new G-E guide is a handy reference chart for maintaining your present system... and more! It helps you to determine whether, and how, *improvements* can be made in the combination of lamps, starters, ballasts, etc., that you have now... to deliver *more* of the type of light *you* require, at *lower cost*. It brings up points you may not have realized before, that can make your job easier.

Ask your General Electric distributor for the new G-E Maintenance Guide for Fluorescent Lighting, or write General Electric Company, Wiring Device Dept., Providence 7, R.I.

GENERAL ELECTRIC

FILMS

Vacuum Pouring for Better Forgings demonstrates how steel forging ingots up to 500,000 lb. are made with only minimal traces of hydrogen by pouring steel through a vacuum. Both live action and animation are used to present steps of vacuum pouring, and high-speed sequence shows trapped gases exploding into the vacuum as metal cascades into ingot mold. 16mm, color, sound, 13 min. For loan, write to:

Modern Talking Picture Service, 3 East 54th St., New York 22.

How to Weld "T-1" Steel dramatizes the reasons why it is important to use the right electrodes, the right welding heat, and the right procedures. The film shows, step-by-step, how easy it is to insure sound welds in structures and equipment fabricated from this steel. Includes booklet of techniques as well as a handy welding heat input calculator. 16mm, color, sound, 18 min. Write to:

United States Steel Corp., 525 William Penn Place, Pittsburgh 30.

More Profit for Builders covers basic scaffolding set-up and how it's used in all kinds of maintenance work (as well as on construction jobs). The film presents many interesting and unusual scaffolding applications. 16mm, sound, color, 20 min. For loan, write to:

Thos J. Barbre Productions, Library Div., 2130 So. Bellaire St., Denver 22, Colo.

The Petrified River deals with the use of uranium for peaceful purposes and illustrates the many benefits atomic energy *could* give the world. Much of the film was photographed in the colorful regions of the flat-topped mesas in Colorado. 16mm, sound, color, 27 min. For loan, write to:

Modern Talking Picture Service, 3 East 54th St., New York 22.

Reaching for the Stars tells the story of man's quest for knowledge, and how he uses the telescope as his eyes in searching, seeking, and probing the secrets of space. 16mm, color, sound, 14 min. For loan, write to:

Association Films, Inc., Broad at Elm Ave., Ridgefield, N. J.

Discover the advantages of engineered plant housekeeping

Hundreds of companies have realized important benefits from programmed housekeeping procedures. Our free booklet ENGINEERED MAINTENANCE tells you how you can institute your own program... at no additional cost!

Send for this FREE book today!

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916 ASHBY STREET, N.W., ATLANTA 18, GA.
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"SUCCESSFUL SUPERVISION" KIT

Includes:

- ACCIDENT PREVENTION
- MOTIVATION
- LINE-STAFF RELATIONS
- COST AND WASTE CONTROL
- FACTS AND FORECASTS
- CUSTOMER RELATIONS
- 50 PAGE PLANNING GUIDE
- THE SIX BASIC PRINCIPLES

This valuable kit is yours without obligation. Simply fill out the coupon and mail it today.

ELLIOTT SERVICE COMPANY, INC.
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ARNOFOAM

• INSULATES
• SEALS • CUSHIONS

- Polyurethane foam tape with pressure sensitive adhesive
- Thousands of non-connected air cells—density only 2 lbs. per cubic foot
- Insulates against heat and cold
- Deadens sound
- Seals out dust, dirt
- Absorbs shock and vibration, no bounce-back
- Waterproof, vaporproof
- Resists acids, grease, solvents

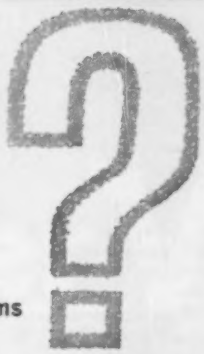
Available in 1/8", 1/4" and 1/2" thicknesses, widths from 1/4" to 36". Write for data.

ARNO ADHESIVE TAPES, INC. 5209 Ohio St., Michigan City, Ind. *Dr. Scholl's Adhesive Tape Division*

MANUFACTURERS AGENTS WANTED FOR SOME SELECTED AREAS

For more facts Circle 578 on Reader Service Card

Waterproofing?
Dampproofing?
Corrosion Proofing?
Insulation Coating?



Flintkote Data Sheets Help Solve Your Problems

Many Flintkote asphalt emulsions and cutbacks are specially designed and field proven for protecting metal, masonry and insulation against water, dampness and corrosion under most severe conditions, among them:

C-13-E EMULSION: – Non-fibrated asphalt base clay emulsion protects metal and masonry from weather, water and corrosive elements.

C-13-A EMULSION:—Heavily fibrated breathing type of coating for moisture protection of insulation.

FLINTKOTE C-19: – A tough vapor sealing asphalt cutback, spray-applied for protection of low temperature equipment.

Write to:
Industrial Products Department,
The Flintkote Company,
30 Rockefeller Plaza, N.Y. 20, N.Y.

FLINTKOTE®

America's Broadest Line of Building Products

For more facts Circle 579 on Reader Service Card

CARRIER CABINET UNIT HEATERS

...versatile in application, economical in operation and handsomely styled!

For new construction or modernization, there's a cabinet style and size in this Carrier line to meet your needs for almost any heating job. They're available in free-standing, variable semi-recessed and recessed models for floor, wall or ceiling mounting. Sizes range from 20,800 to 117,000 Btuh, and there are twenty-one coil-cabinet arrangements for either steam or hot water systems. Advantages? Many; among them:

- All connections may be made within cabinet – no piping need be exposed.
- Low fan speed keeps noise level low – yet, where needed, high fan speed can deliver large volumes of air to hard-to-heat corners.
- High-capacity coils with non-ferrous fins and tubes provide maximum heat transfer and long life.
- Totally enclosed, permanently lubricated motor.
- Whole assembly can be removed if an inspection or fan cleaning is required.

Carrier offers every type of equipment for any industrial or commercial job: Heating and Ventilating Units for steam and hot water; Unit Heaters for steam and hot water; Gas-fired Unit Heaters and Duct-furnaces. For complete information, call your Carrier representative listed in your Classified Telephone Directory under "Heaters—Unit." Or write Carrier Air Conditioning Company, Syracuse 1, New York.

Carrier

Air Conditioning Company

For more facts Circle 580 on Reader Service Card

We like to work with hardboiled plant location people. The harder-boiled the better. That's because we can prove the Toledo-Northwestern Ohio area offers unmatched opportunities for these specific industries:

PAPER AND PLASTICS PRODUCTS
BUILDING AND STONE PRODUCTS
FOOD PROCESSING • CHEMICAL PROCESS
MACHINERY PRODUCTION
PRIMARY METALS • ELECTRONICS

Our proof is contained in a survey of the area by Fantus Research, Inc., one of the nation's foremost industrial location services. For more information, write or call R. E. Johnson, Manager, Industrial Development Department, The Toledo Edison Company, Toledo 1, Ohio.

THE TOLEDO EDISON COMPANY
an investor-owned electric light and power company serving Northwestern Ohio

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, circle numbers on Reader Service Card.

MAINTENANCE

275—Epoxy coatings. Literature on coatings for metal, wood, masonry protection. Hauger-Beegle Associates, Inc.

276—Lubricants. Data Book is an informative treatise on lubrication. Lubriplate Div., Fiske Bros. Refining Co.

277—Machinery mounts. Bulletin 60-04A, "Practical Considerations When Installing Machinery." Barry Wright Corp.

278—Scaffolds. Want circulars on stairway, span-type, Tallescope aluminum scaffolds? Up-Right Scaffolds.

279—Engineered maintenance. This 16-pager outlines benefits of programed housekeeping. Puritan Chemical Co.

280—Machine mounts. Details on new machine mount promotional selling aids. Unisorb Div., Felters Co.

281—Paint. 2 booklets: "Reference Paint Guide." "How to Reduce Painting Costs." Barreled Sunlight Paint Co.

282—Adhesive coating. Bulletins on self-curing Adfinish coatings for finishing masonry walls. Swift & Co.

283—Paint. Booklet, "Color Dynamics," tells what it is and how it's used. Paint Div., Pittsburgh Plate Glass Co.

MECHANICAL

284—Bearings. Bulletin lists line of mounted bearings to meet almost every requirement. Dodge Mfg. Corp.

285—Gears. Catalog No. 360 contains detailed information and engineering data on reducers. Perfection Gear Co.

286—Variable speed drives. Bulletin 25103 on drives—capacities from fractional to 25 hp. T. B. Wood's Sons Co.

287—Roller chain, sprockets. You'll want Catalog 760 that describes chain, sprockets, couplings. Diamond Chain Co.

BUILDING

288—Plant site. Here's survey of selected locations for new plant in New York State. N. Y. State Dept. of Commerce.

289—Plant site. All about plant location facilities in Toledo-Northwestern Ohio area. Toledo Edison Co.

290—Glass block. Window Renovation Kit shows how to solve window area problems. Pittsburgh-Corning Corp.

291—Complete buildings. Booklet, "Buildings Unprecedented," lists over 400 basic designs. Butler Mfg. Co.

292—Wall panels. Bulletin 61W gives information on interlocking metal panels. Elwin G. Smith Co., Inc.

MATERIAL HANDLING

293—Tote boxes. Catalog outlines features of durable molded glass fiber boxes. Molded Fiber Glass Tray Co.

294—Roller skids. Want catalog and a 12-page booklet on heavy equipment handling, hauling? Stokvis Multiton Corp.

295—Shelving/lockers. Booklet, "12 Losses Penco Planning Can Control," yours on request. Alan Wood Steel Co.

296—Conveyors. Here are catalogs on chain, screw, belt, drag, trolley, and other conveyors. Link-Belt Co.

297—Tractor shovel. Data on H-30B 4-wheel drive bulk-handling tractor, 3750-lb. capacity. The Frank G. Hough Co.

298—Chain. Bulletin 14-A on alloy sling chains, electric flash welded. Sizes 9/32 to 2 in. S. G. Taylor Chain Co.

299—Storage racks. Catalog gives facts on slide-and-lock adjustable racks. American Metal Products Co.

300—Steel equipment. Catalog 100 (100 pages) describes and shows diversified line. Lyon Metal Products, Inc.

301—Pumps. Booklet, "How to Solve Pumping Problems," tells how to transfer liquids. Roper Hydraulics, Inc.

302—Shelving. Brochure covers simple, adjustable, rapidly assembled economical line. Borroughs Mfg. Co.

303—Hoist. Catalog on electric chain hoists—⅛ to 2 tons; 8 to 60 fpm. speeds. Chisholm-Moore Hoist Div.

304—Storage racks. Information on flexible Air-row Head racks with only two basic parts. Equipment Mfg., Inc.

305—Casters, wheels. Here's helpful manual that lists types for every kind of use or floor. Darnell Corp., Ltd.

306—Hoist. Section 86 bulletins on air hoists up to 4000 lb. Piston and rotary types. Gardner-Denver Co.

307—Lift trucks. Detailed literature on exclusive foot-controlled feature for driving and hoisting. Hyster Co.

Turn the page

Introducing a magnificent NEW line of industrial lighting fixtures from Sylvania . . .

The **Power-V** Series

Today you can specify or purchase a wide variety of industrial lighting fixtures at varying prices. Many of these fixtures have particular features that make them advantageous to use in specific applications.

But now from Sylvania comes a complete and versatile line of NEW industrial fixtures . . . a series that includes all of the features you normally look for in a fixture plus outstanding quality points all its own.

THIS IS SYLVANIA'S POWER-V SERIES

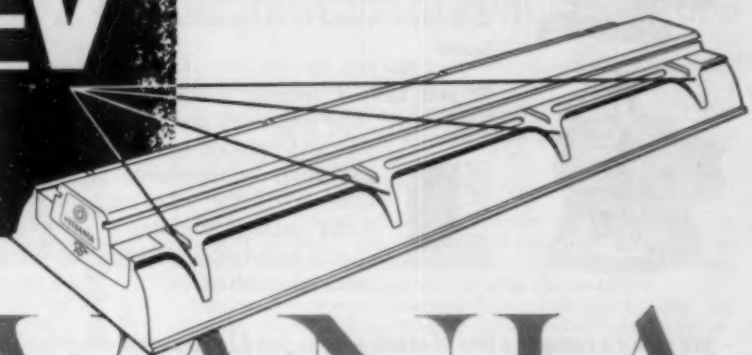
A ruggedly-built series that shrugs off accidental abuse . . . that features a new concept of design providing a wider and deeper embossed reflector for better lighting yet maintaining a low silhouette for handsome appearance.

Power-V units are designed to meet RLM specs and can handle all types of the powerful 1500 ma extra-high output lamps.

The Power-V Series is simple to install . . . easy to maintain . . . provides long, trouble-free service . . . yet is modest in cost.

If you have any interest in industrial lighting, you should learn about Sylvania's Power-V Series. For additional information, write to:

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS INC.
One 48th Street, Wheeling, West Virginia



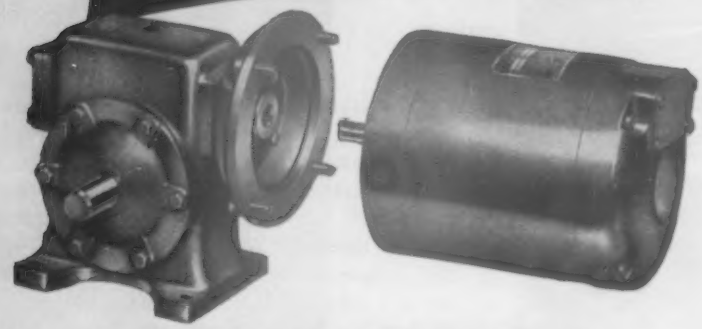
LIGHTING FIXTURES BY

SYLVANIA

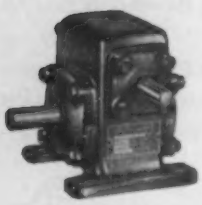
SUBSIDIARY OF
GENERAL TELEPHONE & ELECTRONICS

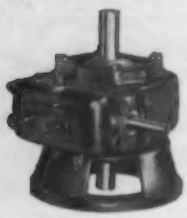
GENERAL SYSTEM

Precision Engineered-
Performance Tested



PERFECTION
Worm Gear
SPEED REDUCERS



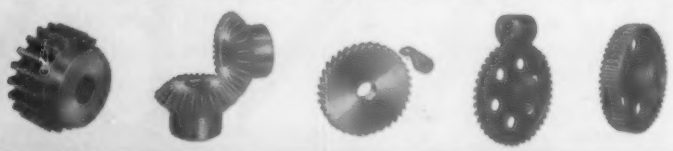


One of our major capabilities is to design, develop and produce speed reducers that will insure maximum performance and economy in your operation. Our experience in the special problems and objectives of power transmission is broad and deep. The men at American Stock Gear having this important capability, use the most advanced analytical engineering facilities to design speed reducers to meet tomorrows needs.

Whatever size or style reducer you need, you'll find the right combination in the complete Perfection line – a line that is precision engineered and performance tested in thousands of different applications.

If you have a reducer problem that you feel is "different", our engineers are ready to advise, design and produce speed reducers to your particular requirements. In the meantime, write for your copy of our Reducer catalog containing illustrations, charts and tables to help you on your next application.

We make a complete line of stock gears. Send for Gear catalog No. 360.



AMERICAN STOCK GEAR DIVISION
PERFECTION GEAR COMPANY, HARVEY, ILLINOIS

Begins on page 264

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, use Reader Service Card.

308—Batteries. Data on how storage batteries work, how to keep in top condition. Electric Storage Battery Co.

309—Fork-lift trucks. Catalog lists more than 40 standard models—1 to 20 tons. Elwell-Parker Electric Co.

310—Pneumatic conveyors. Bulletin M-588 on pneumatic conveying systems. Many applications. The Day Co.

311—Bulk storage tanks. Bulletin 574 gives complete data on types for variety of applications. The Day Co.

312—Battery chargers. Catalog lists equipment to fit every electric truck installation. Gould-National Batteries.

313—Containers. Full details on aluminum containers. Sizes: 2½, 4, 6, 9, and 14 gal. Wear-Ever Aluminum, Inc.

314—Tramrails. Booklet No. 2032 on overhead handling equipment and new "Tarca" track. Cleveland Tramrail Div.

315—Trambeam systems. Bulletin M-34 illustrates trambeam overhead material handling systems. Whiting Corp.

PLANT SERVICES

316—Vacuum systems. Catalog No. 155B gives details on systems for dust control. Spencer Turbine Co.

317—Automated food service. Here's data on fully automated food service. Automatic Canteen Co. of America.

318—Heat exchanger. Bulletins 120 and 132 describe self-contained fluid cooling systems. Niagara Blower Co.

319—Air filtration. Bulletin 108A gives data on Dorex three-way filtration system. Connor Engineering Corp.

320—Dust collectors. Here's basic information for selecting right type from more than 50 models. Aget Mfg. Co.

321—Air conditioning. Booklet 518 describes complete line of component products. American Air Filter Co.

322—Washfountains, showers. Publication No. 1380 gives data, styles, and sizes. Bradley Washfountain Co.

323—Pipe insulation. Catalogs contain details on insulation for hot and cold piping. Pittsburgh-Corning Corp.

Turn the page

Stack-n-Nest® containers make "CENTS" in every handling system

1. Matching covers for clean storage
2. Pans nest . . . for minimum storage space
3. Pans stack securely for multiple handling and safe, high storage
4. Matching dollies for rapid, easy movement

Write for brochure on complete line. Also ask for information on Lewis Woven Wood-and-Wire Containers, Plastibox Assembly Bins and Mounting Accessories, and PolyLewton Food Handling Pans.

G.B. Lewis COMPANY

1210 Montgomery Street • Watertown, Wisconsin

For more facts Circle 584 on Reader Service Card

TALLY-PRINT counts practically anything—prints totals on tape at periodic intervals and shows accumulated totals visually.

Tally-Print shows **how much** production you get—and exactly **when** you get it!

Machine production, gallons of gas pumped, cash register sales, conveyor traffic—are but a few of the operations monitored.

Tape chart pinpoints peaks and lows, furnishes accurate cost- and time-study data, guides distribution of men and equipment.

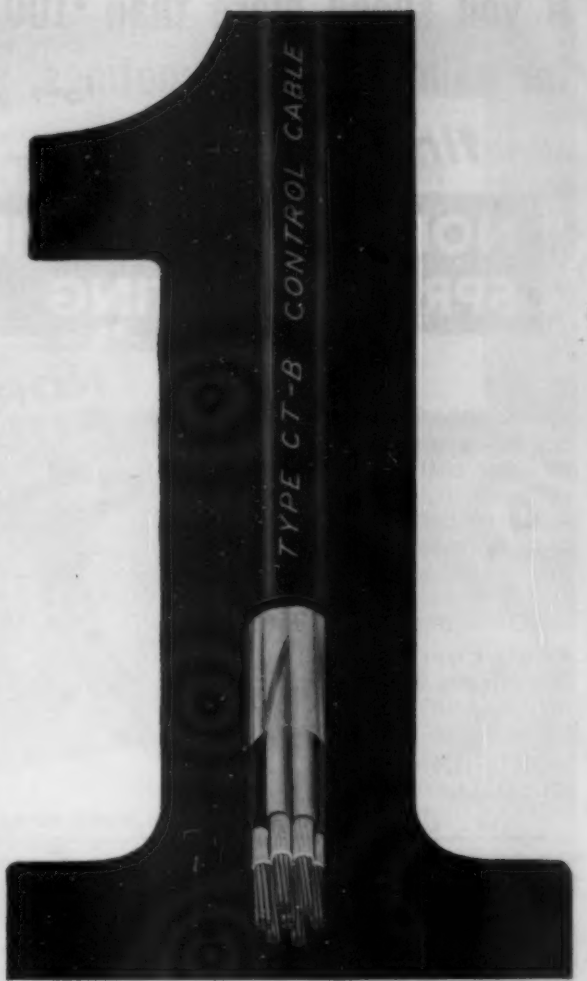
Tally-Print is universal in application, easy to install and extremely low in cost.

With Manual Reset.....$225
With Automatic Reset.....$295

For full details, write for free Catalog

standard INSTRUMENT CORP
657 BROADWAY, NEW YORK 12, N. Y.

For more facts Circle 585 on Reader Service Card



Use one standard cable for most multi-conductor jobs

You can now get quick delivery on *standard* control cable from Rome in any combination of:

- Type CT-B for AC or DC voltages to 600, or type CT-C for voltages to 1000. Both meet IPCEA-NEMA standards.
- 1 to 37 conductors
- No. 10 or No. 12 AWG stranded copper conductors

These CT cables are lighter, smaller, more flexible than standard rubber types. Each conductor is insulated with polyethylene for maximum dielectric capability, particularly where moisture, acids, alkalies or oils are problems.

The conductor and cable jackets are Synthinol (polyvinyl chloride), providing mechanical protection and added resistance to heat, flame, chemicals and corrosion.

Many sizes can be delivered off the shelf. A list of these, and all the facts and figures on this standard CT control cable, are contained in a 4-page booklet. For your copy, write to Rome Cable Division of Alcoa, Dept. 21-101, Rome, N. Y.

ALCOA
ROME CABLE
DIVISION

For more facts Circle 586 on Reader Service Card

if you spend more than $100 per week for paint or other coatings, you should *find out about...*

NORDSON HOT AIRLESS SPRAY PAINTING

The Nordson Hot Airless System can save you up to 30% on paint or other coating materials and on labor too! Less expensive spray booths and exhaust systems are needed. Clean up and housekeeping costs are reduced and at the same time finishing quality is improved.

Find out how Nordson Hot Airless can pay off for you, in savings and in improved quality. Write today!

NORDSON CORPORATION
37 Jackson St., Amherst, Ohio

For more facts Circle 587 on Reader Service Card

When Is a Conveyor MORE THAN A CONVEYOR?

Manufacturers of products ranging from powdered materials to pickles are using AJAX Vibrating Lo-Veyors for such extra operations as cooling, washing, dewatering, drying, scalping, sorting, aligning, sizing and others. This one machine does the work of two or more for the price of only one. Completely enclosed reciprocating drive unit and spring loaded supporting arms mounted in rubber bushings eliminate head and tail pulleys, idler rollers and bearings. They vastly reduce maintenance costs.

AJAX Lo-Veyors and feeders are available in a wide range of sizes and capacities. Take advantage of the broad experience of AJAX vibration engineers. *Write or phone FAirview 6-3121.*

AJAX
Incorporated 1920

Conveyor Division

AJAX FLEXIBLE COUPLING CO. INC.
35 Portage Road Westfield, N. Y.
Representatives in Principal Cities

Begins on page 264

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month for this issue. For items you want, use Reader Service Card.

324—Dust collectors. Bulletin 562-D has information on dust- and fume-control problems. Wheelabrator Corp.

325—Paging system. Here are 8 pages of facts about personal call paging system. Multitone Electronics, Ltd.

326—Watchclock. Property protection manual gives information on guardsman watchclock. Detex Watchclock Corp.

327—Slotted angle. Want new illustrated idea booklet, "Creative Framing at Lowest Cost"? Acme Steel Co.

328—Fumes control. Need data on conversion of fumes to Btu.'s for processing, etc.? Catalytic Combustion Corp.

ELECTRICAL

329—Lay-in duct. Literature on versatile duct in two types—hinged cover and screw cover. Square D Co.

330—Cable. This booklet lists sizes of standard cable for most multi-conductor jobs. Rome Cable Div. of Alcoa.

331—Silicones. Literature describes use of silicones for insulation on motors, transformers. Dow Corning Corp.

332—Magnetic starters. Information on magnetic starters, plus 3-minute "jig-saw" demonstrator. Square D Co.

333—Limit switches. Catalog 84 covers nine types of "Plug-in Limit" switches. Micro Switch Div., Honeywell.

334—Explosion-proof switches. Catalog 83 describes switches for use in danger areas. Micro Switch Div., Honeywell.

PRODUCTION

335—Electric power tools. Catalog has 68 pages of data on complete line of electric-power tools. Skil Corp.

336—Visible records. Booklet explains product-planning and control panels. Acme Visible Records, Inc.

337—Paint spray guns. Bulletins A96-IR and A96-4 tell about automatically operated spray guns. Binks Mfg. Co.

338—Data processing. Brochure CPB-152 on centralized monitoring, data collection system. General Electric Co.

For more facts Circle 588 on Reader Service Card

Select ROLLWAY®... *it's your one best way!*

Rollway's 400 Distributors are carefully stocked and located to give you off-the-shelf service. Or, where distance requires, to ship by overnight truck, train or plane.

Rollway Solid-Cylindrical Roller Bearings are the made-to-order solution for replacement bearing problems. Engineered for specific service in a wider range of applications, the Rollway line offers a single source for light - or - heavy - duty precision radial and thrust bearings . . . for economical, utility-type Tru-Rols® . . . for low-cost inch and metric steel cage assemblies.

In application after application, field experience proves that actual service-life of Rollway Bearings clusters near the far end of the expectancy tables. You not only get replacements *faster* . . . you get replacements that *last longer!*

- **Ask your Distributor for a complete product line bulletin. Or write direct to Rollway Bearing Company, Inc., Syracuse, N. Y.**

You can depend on

ROLLWAY® BEARINGS

ENGINEERING OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Seattle • Houston • Philadelphia • LosAngeles • SanFrancisco

Staple-nailing expendable skids, crates and boxes.

Portable stapling plier solves carton assembly problem.

Attaching shipping tags to filled corrugated cartons.

Fastening liners and protective pads to shipping containers.

DUO-FAST gives you four "extra men" in your packaging and shipping departments

One man, plus a DUO-FAST Stapler, can outwork four men using old-fashioned fastening methods on industrial packaging. And that adds up to money saved.

Whether it is staple-nailing crates, assembling corrugated cartons, lining box cars, or attaching labels to filled cartons . . . DUO-FAST has the correct model and staple needed to do a good job, and do it fast!

You'll like DUO-FAST. You'll like the Free Service Guarantee. Write for the FT-17 Industrial Packaging Brochure, and the address of your DUO-FAST representative.

FASTENER CORPORATION 3702-10 River Road. Franklin Park, Illinois 1270

DUO-FAST Staplers Tackers Staples

Everything you need for tacking, stapling and nailing.

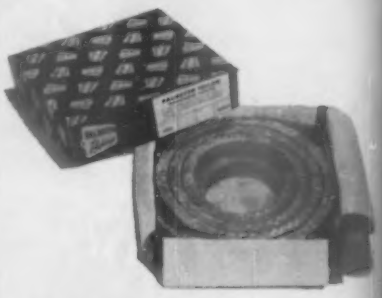
For more facts Circle 590 on Reader Service Card

I'll be Seeing YOU

There is a good chance you will see your Palmetto® Representative today—whether you are ordering packings or not.

For maintenance use, Palmetto is offered exclusively through the industrial distributor—a local businessman who supplies many other products you use and is familiar with your particular operation.

This experienced, local service is the bonus you receive when you specify *Palmetto*—industry's standard of quality packing!



FOR EXAMPLE

To seal against highly corrosive acids or alkalis: Palmetto offers 6 different styles of braided asbestos packing impregnated with low-friction, chemically inert TEFLON* suspensoid . . . and new CF pure TEFLON FILAMENT PACKING.

Your Palmetto distributor is best suited to guide your selection, and he can fill your order—today.

Ask for Braided Packings Catalog BP, and for the name of your nearest Palmetto Distributor.

*E. I. du Pont de Nemours & Co. (Inc.) trademark for Polytetrafluoroethylene

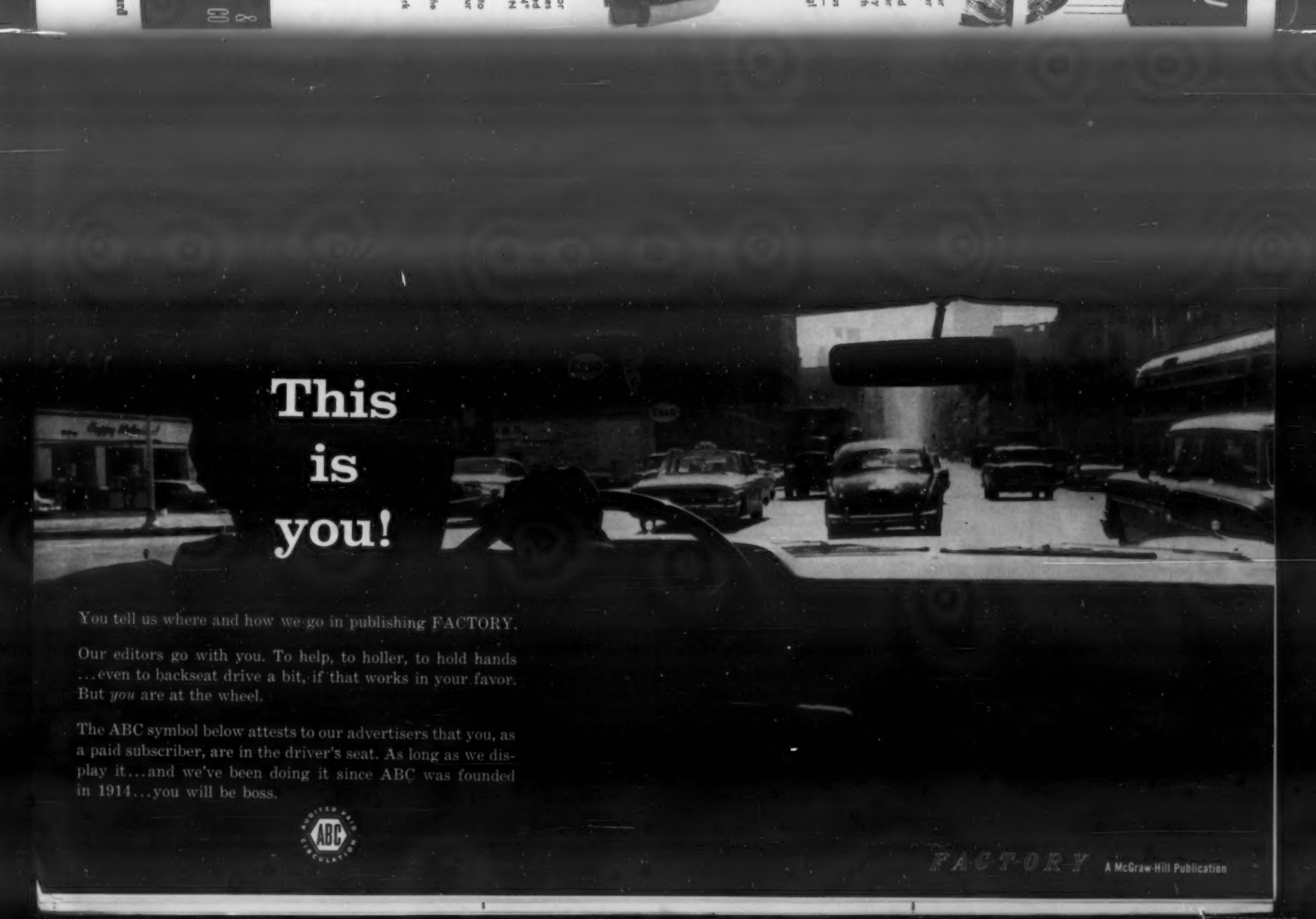
PALMETTO PACKINGS

GREENE, TWEED & CO

OUR 99TH YEAR

NORTH WALES, PA.

Circle 591 on Reader Service Card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You tell us where and how we go in publishing FACTORY.
Our editors go with you. To help, to holler, to hold hands ...even to backseat drive a bit, if that works in your favor. But *you* are at the wheel.
The ABC symbol below attests to our advertisers that you, as a paid subscriber, are in the driver's seat. As long as we display it...and we've been doing it since ABC was founded in 1914...you will be boss.
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WEIGHTLESSNESS MAY BE A FACTOR IN OUTER SPACE...

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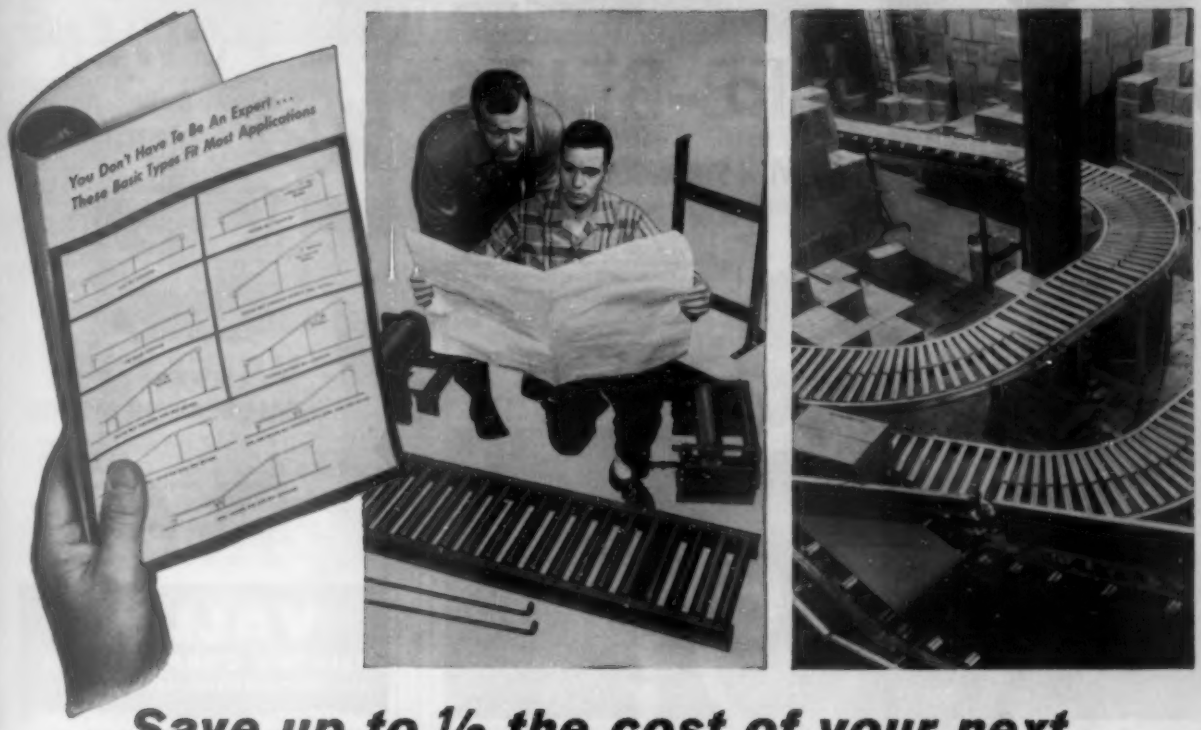

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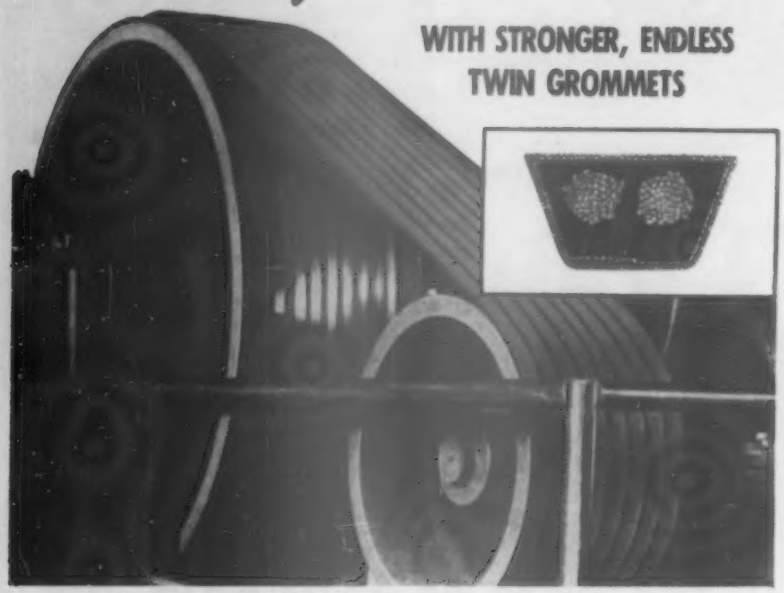

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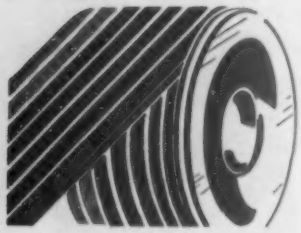

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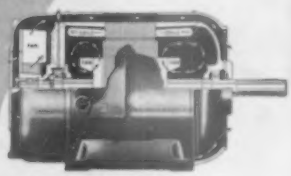

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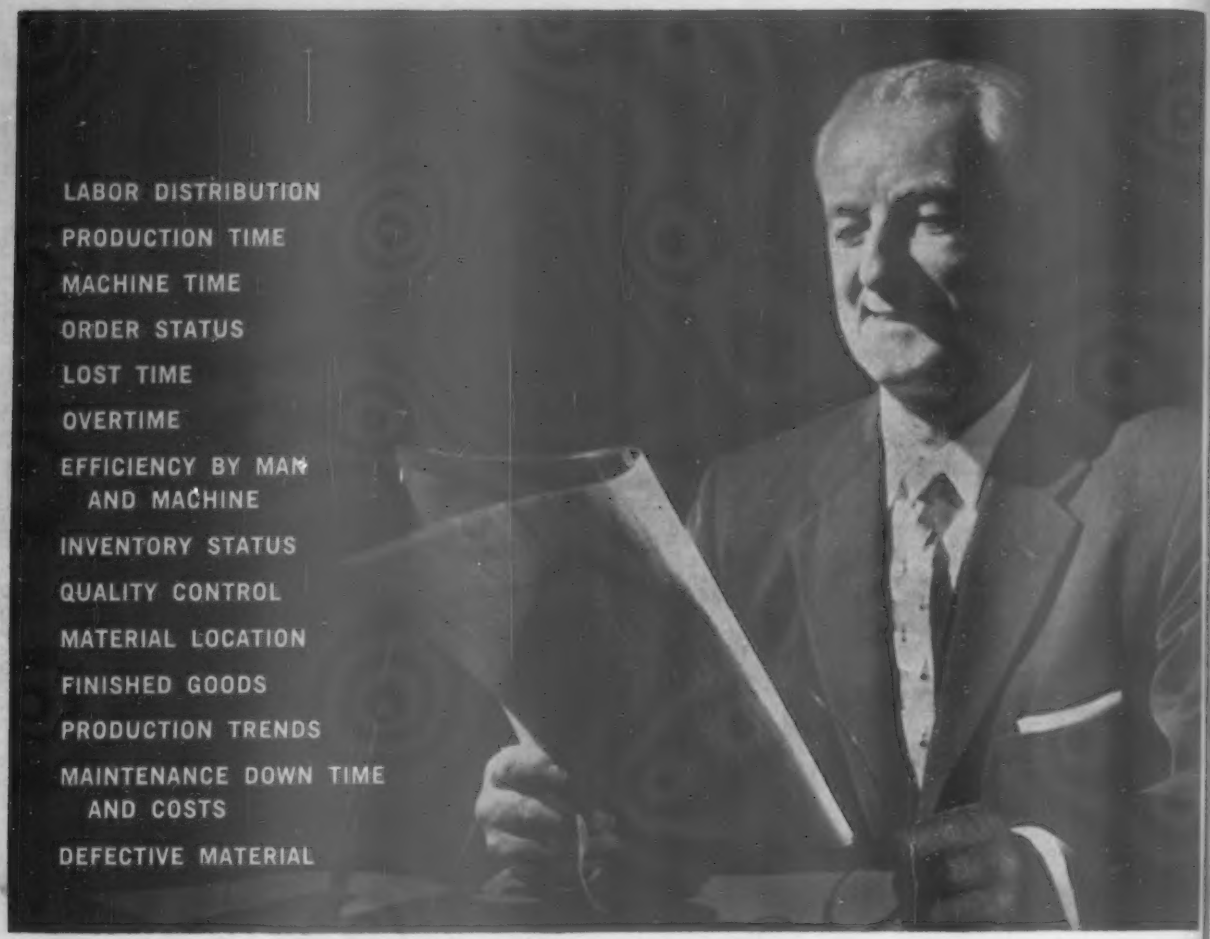

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MATERIALS —		195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213						
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IDEAS OF THE MONTH —		236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252								
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ADVERTISERS' LITERATURE —		275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290									
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ADVERTISEMENTS —		404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421							
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NAME..... TITLE.....

Card Good Only Through January 1962

COMPANY..... October 1961-2

STREET..... CITY AND STATE.....

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NAME..... TITLE.....

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COMPANY..... October 1961-1

STREET..... CITY AND STATE.....

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1—Traveling cranes
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3—Material handling equipment
4—Steel band conveyors
5—Conveyors
6—Wire rope conveyors
7—Material handling equipment
8—Vibrating conveyors
9—Tying machines

AUXILIARY
10—Heating, ventilating units
11—Vertical unit boilers
12—Process and other equipment
13—Pumps
14—Fans
15—Wound rotor motors
16—Air units
17—Pumps

MAINTENANCE
18—Dust control
19—Spray booths, equipment
20—Steel shelving
21—Flooded plate scrubber
22—Gas-fired equipment
23—Casters, wheels

ELECTRICAL
24—Capacitors
25—Armored cable
26—Circuit breakers
27—Magnetic drives
28—Emergency lighting systems
29—Power fuses
30—Battery chargers
31—Indoor, outdoor lamps
32—Gasoline electric set

BUILDING
33—Steel panels, framing sections
34—Structural materials
35—Acoustic panels
36—Partitions
37—Fire doors, exit hardware

INSTRUMENTS AND CONTROLS
38—Humidity instrumentation
39—Pressure gauges
40—Data acquisition system
41—Recording wave analyzer
42—Heating furnace controls
43—Surfindicator

PRODUCTION
44—Innershield welding
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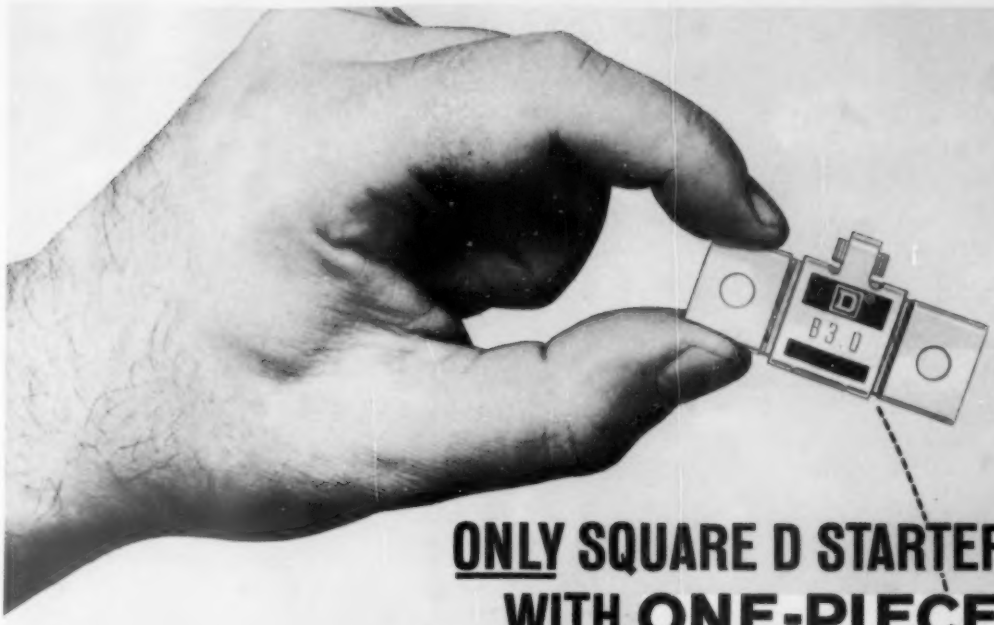
46—Weldments
47—Machine drives
48—Ceramic tooling
49—Positioning controls
50—Machine tools
51—Wet blasting

VALVES AND PIPE FITTINGS
52—Pipe fittings
53—Valves
54—Air control products
55—Tube fittings
56—Rotary valves

MECHANICAL
57—Thermocouples
58—Hydraulic checking unit
59—Power transmission device
60—Pumps
61—Drives, couplings
62—Blowers



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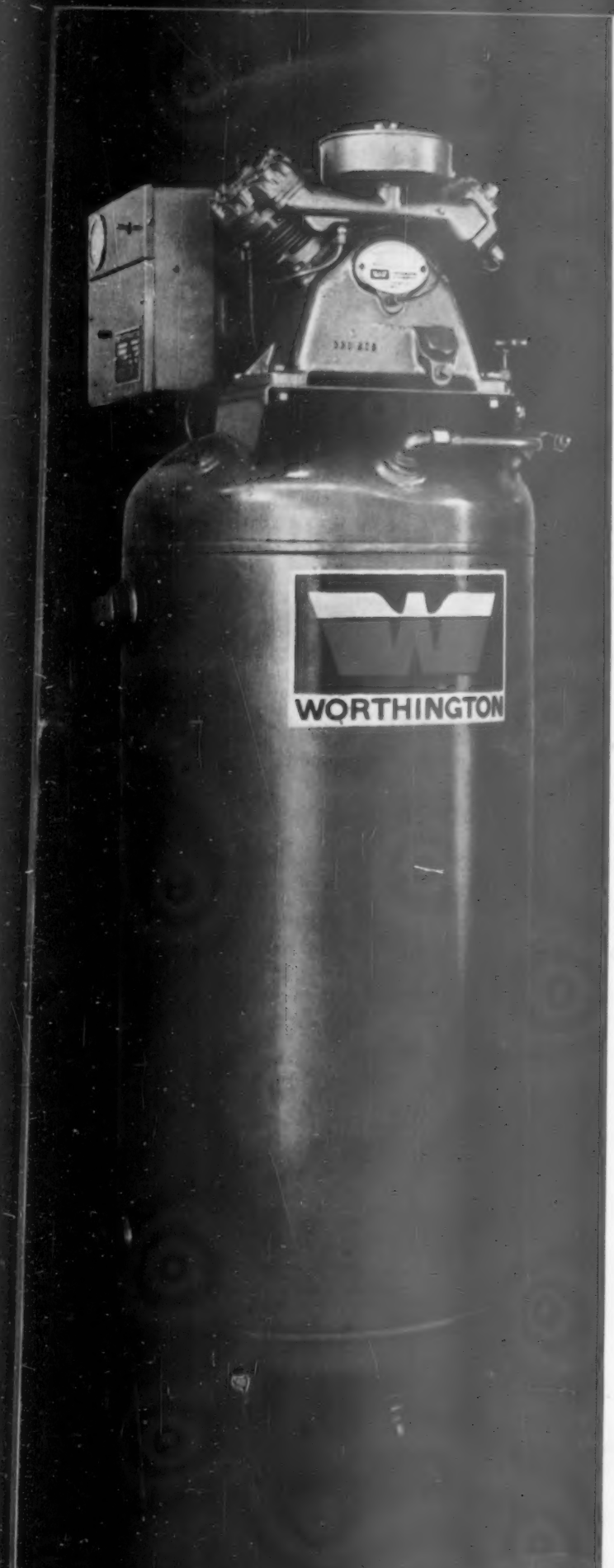

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A silicon-treated filter element removes over 99% of the dirt from incoming air—the most dangerous source of compressor wear. Tapered roller bearings cut friction. The large lubricating oil sump permits better cooling, less danger from low oil supply. These and other design features assure extremely long compressor life.

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